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Brass Manufacturing Progress

Improvements in the Mechanical Working of Brass Over a Period of a Quarter Century

Written for The Metal Industry by W. R. CLARK, General Works Manager, Bridgeport Brass Company

W. R. CLARK

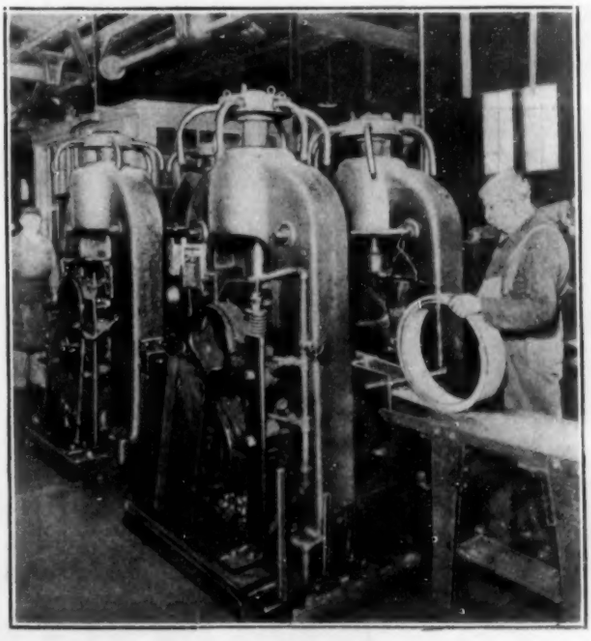
During the last twenty-five years the art of brass processing has advanced considerably. This has been chiefly due to better control and greater realization of the necessity for such control in mixture and heat treatment. In the old days, when laboratories were not as efficient or as extensively used as they are today, and when annealing was largely determined by eye, the limit of working which a batch of brass would stand was gauged by the poorest sample in the batch. As the difference between the poorest sample and the best sample diminished, it was found that operations could be performed which would more nearly equal those which the best sample would stand. This is one of the factors which has made mechanical developments possible in various processes.

CASTING

The outstanding improvement during the last 25 years has been in the casting shop. For years previous to 1916 the brass industry had been endeavoring to improve its melting methods, to get away from the undesirable coal-fired crucible furnace with its dirt and smoke and dependence upon the personal element in operation. The Bridgeport Brass Company had carefully followed progress in this field but was not satisfied that a real solution had been found until the induction type of electric furnace was developed. When the Ajax Metal Company announced the completion of a furnace in actual operation and with a demonstrated ability to melt commercial brass mixtures, the Bridgeport Brass Company was the first to grasp the possibilities of this development in the wrought brass industry and in October, 1916, installed two furnaces for commercial melting of brass. These were successful from the start but required the careful working out of details, that always accompanies a pioneer development. After patiently solving one after another of these problems, the Bridgeport company contracted for a license to build and operate 24 furnaces of the Ajax type, and before the end of 1917 had 8 in operation. These were increased to 20 during the next year. This resulted in the building at Bridgeport of the first modern brass casting shop in the world—without a chimney.

HEAVIER AND FASTER ROLLS

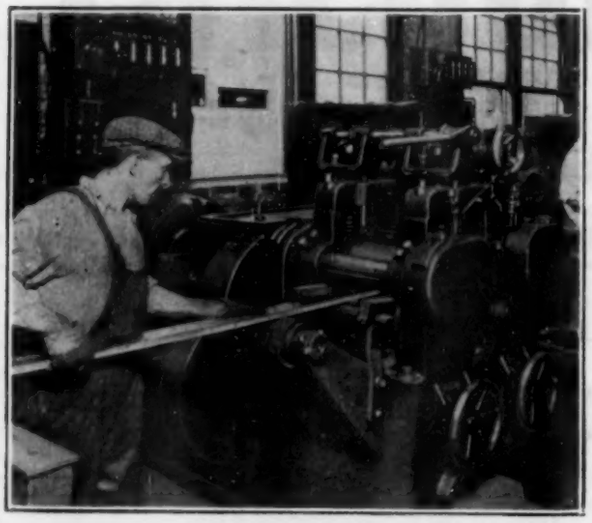
Rolling mill practice has shown a marked tendency toward heavier rolls traveling at higher speeds. With the heavier rolls greater reductions per operation have been possible so that fewer operations to arrive at the finished gauge have been required. Along with higher speeds on thinner gauges of brass, the old method of grasping the strip of metal leaving the rolls by hand and winding it on a block, has been displaced by guides and automatic winding blocks which permit higher roll speeds without danger to the rollers.



TANDEM ROLLING

TANDEM ROLLING

In order to reduce handling still further, the Bridgeport Brass Company developed a method of tandem rolling for brass which enables the bar to be rolled in two or



SLAB MILLING

more stands at the same time. The limit of rolling in this case is the amount of reduction which the metal will stand, after an anneal, before it becomes so hard that it will tend to crack on the edges. Patents were issued to W. R. Clark and W. R. Webster and assigned to the Bridgeport Brass Company covering the various methods of bringing this about.

In ordinary rolling practice, two heavy reductions are possible between annealing operations. These are performed by the Bridgeport Brass Company on two mills in tandem, instead of, as formerly, by passing the metal once through the rolls, coiling, then passing a second time through the same rolls.

SLAB MILLING MACHINE

Another improvement was the development of the slab milling machine which takes the place of the old scalping or overhauling machines formerly in use. This was developed and patented by A. Henderson, works manager,

ANNEALING AND PICKLING

of the Detroit Brass and Copper Company, and has had wide use in the industry. It has greatly speeded up the operation of machining the surfaces of the bars and has made the operation much safer and less laborious.

PICKLING, CLEANING AND SLITTING

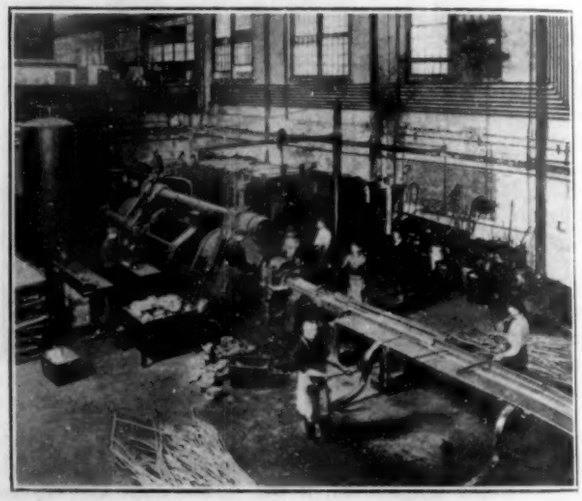
The general use of cranes for handling the product between operations and over pickling tubs has increased. A continuous pickling and cleaning machine has been developed and perfected by August Sundh. Automatic scrap cutters have been developed and applied to slitting machines which dispose of the scrap in the most satisfactory manner and at the same time permit of higher slitting speeds than were formerly used.

ELECTRIC ANNEALING

Electric annealing is beginning to be used in rolling mills and other departments for closer control of the temper and grain size of the finished product. The general use of pyrometers on all heating furnaces has resulted in a much more uniform product, permitting greater reduction between operations and at the same time supplying the cutting-up shop with a product that will, in general, give uniformly better cups with smoother surfaces than formerly.

EXTRUSION

The general adoption of the extrusion process in rod and wire manufacture is the outstanding development in these departments. This method was first introduced into this country by the American Brass Company at the Co



EXTRUSION (ROD MILL)

Brass Company, Ansonia plant, but received its real impetus with the invention of high speed steels, which permitted its development on a much wider variety of mixtures than was originally possible.

The original machines working on shapes manufactured from low grade yellow brass exerted pressures of perhaps 15 tons per sq. in. on the billet being extruded. Modern machines exert over 50 tons per sq. in. on the extruded billet and permit mixtures to be extruded containing higher copper, together with lead or tin additions, as desired.

Practically all rod used for screw machine products is now made by this process, as well as a considerable amount of ordinary brass wire. This has superseded the cold rolling process in most cases, except on cartridge brass and allied mixtures that fail to extrude satisfactorily, even with the high pressures now employed.

COLD ROLLING MILL

Before the Bridgeport Brass Company adopted the extrusion process, its engineering staff worked out and built a cold rolling rod mill, which was undoubtedly the most efficient mill in the country at that time. Extensive experiments were carried out in determining the best forms

of roll groove to reduce the stock in the fewest number of operations, and a high-speed self-contained rolling mill was built with crane handling and continuous annealing, to roll 1½ inch or 1⅞ inch rods down to ½ inch or ¾ inch in 6 passes ready for drawing into wire.

After thoroughly investigating the extrusion machine practice, both in this country and in Europe, the Bridgeport Brass Company designed and constructed an extrusion department, which superseded this cold rolling department. This was the the first company successfully to introduce high speed extrusion with the accumulator system, into this country. With the first machine, they were able to extrude tubes as well as rods, but gave up tube extrusion in favor of the Mannesmann piercing process, as this seemed to be the better and cheaper method for tube manufacture.

There has, however, been very little advance during the last twenty-five years in machines for drawing the extruded or cold rolled rod into wire. However, some increase in speed and more flexibility through use of motor drives has been accomplished, and more fine wire machines have been designed. Improved methods of handling have been generally adopted by use of cranes, overhead trolleys or electric mill-trucks. In general, wire-drawing blocks and straightening machines are fundamentally the same as they were twenty-five years ago.

TUBE MILL

Tube mill practice shows a considerable advance during this period. The Bridgeport Brass Company, before erecting a tube mill at its Housatonic plant, carried on some extensive experiments in a small experimental factory in which was installed an automatic arbor draw bench, an automatic pull draw bench and a continuous

MANNESMANN MACHINE. PIERCING BILLETS

annealing and pickling outfit. High speed drawing methods and automatic handling methods were developed in this unit and resulted in the design and installation of machinery in a modern up-to-date mill with crane handling, which materially reduced the cost of drawing tubes. In this mill, each draw bench of 100,000 lbs. pulling capacity, or less, requires but one operator. This results in a production per man-hour, three or four times greater than heretofore obtained.

In one case where an automatic arbor bench was used, the production per man-hour was increased from eight to ten times over former practice. Along with these benches continuous annealing was used quite extensively, and through better control of mixture and annealing temperatures standard operations were put into use, which materially reduced the number of draws and consequent handlings to reach the finished size tube.

MANNESMANN PIERCING MACHINE

A later development was the addition of a Mannesmann piercing machine which was specially designed by engineers of the Bridgeport Brass Company after a thorough survey of the field. This machine forms a tube by spinning a solid billet between rolls over a pointed mandrel and introduces further economies into the manufacture of Muntz metal and copper tubes. This process has been generally adopted by the brass industry, since the expiration of the patents.

The first machine in this country was brought over from Germany by the Benedict and Burnham Manufacturing Company, which is now part of the Waterbury branch of the American Brass Company. Upon the expiration of the original patents, other plants have installed these machines and standardized upon this method of manufacturing Muntz metal and copper tubes. Here again the invention of high speed steel was a potent factor as the points used for piercing, unless made of the proper alloy, quickly lose their shape.

SUMMARY

Summarizing, the outstanding developments in the industry have been due to the utilization of electricity. Perhaps the greatest improvements since the birth of the brass industry is the electric furnace method of melting. Electricity has also contributed largely in the development of laboratory equipment and methods, in pyrometric methods of heat control and in improved handling methods both overhead and on the floor. It has permitted higher speed machinery to be developed through individual drives and increased the control made possible with them.

Silver Supply and Demand

In this tabulation the 1923 production figures are taken from the current report of the Director of the Mint, other figures being based on reliable data from various sources gathered by Handy & Harman, New York.

WORLD SUPPLIES

(In Millions of Fine Ounces)

Production:	1924	1923
United States	65.	73.3
Mexico	92.	90.9
Canada	19.	17.7
All other countries	60.	60.5
Total production	236.	242.4
Proceeds of debased coinage from England	2.	25.
Melted Continental coin	18.	20.
Total	256.	287.4

WORLD CONSUMPTION

Shipments:	1924	1923
To India from the United States	81.2	36.7
To India from England	27.	64.
To China from the United States and Canada	39.1	62.
To China from England	2.6	15.
Arts and Manufactures:		
In the United States	28.	29.2
In England	4.5	4.
Coinage:		
U. S. Mint under Pittman Act	1.1	50.
U. S. Mint—Dore bullion for subsidiary coinage	3.3	—
Mexican Government	11.3	11.5
European countries	50.	—
Other Buyers:		
Origin and destination unknown	7.9	15.
Total	256.	287.4

Testing Materials Society Meeting

Meetings of Metals Committees, Bellevue-Stratford Hotel, Philadelphia, Pa., March 18-20, 1925

Meetings of eleven committees of the American Society for Testing Materials, constituting the Metals Section of the Society, were held at the Bellevue-Stratford Hotel Philadelphia, Wednesday, Thursday and Friday, March 18, 19 and 20, 1925. They were attended by about 200 members and visitors, comprising engineers, metallurgists, chemists and plant managers from the principal steel and iron companies of the country, railroads, electric manufacturing companies, public utilities and the Federal Government. The national officers, President, F. M. Farmer, New York City, Vice-President W. H. Fulweiler, Philadelphia, and Vice-President J. H. Gibboney, Roanoke, Va., were present and addressed the meetings.

Committee D-14 on Screen Wire Cloth

Chairman: R. W. Woodward, Chief Metallurgist, Whitney Manufacturing Company, Hartford, Conn.

Secretary: W. H. Bassett, Technical Superintendent, American Brass Company, Waterbury, Conn.

There are several types of the higher grade screen wire cloth (insect wire cloth) on the market, as for example, copper, bright bronze, low brass, aluminum bronze, silicon bronze, ambrac metal and monel metal screens. What are their relative merits? Which will give the best service under various conditions of exposure and service? With their relative merits known, the users of these materials, which include such groups as the Federal Government (e. g., Army and Navy Departments and Panama Canal), the Pullman Company, owners of large office buildings, etc., can determine which is the most economical to purchase under given market conditions.

Committee D-14 is engaged upon an extensive investigation designed to answer such questions as these. Samples of screen cloth of each of the above materials will be exposed to the atmosphere at four localities, namely, the U. S. Bureau of Mines at Pittsburgh, where the atmosphere is that of a large manufacturing center; at the Portsmouth, Va., Light House, with a normal sea atmosphere; at Panama Canal at a tropical sea coast locality, at which deterioration may be more rapid; and finally, at the U. S. Bureau of Standards at Washington. Three types of frames have been adopted, namely, 12 by 12 in. wooden frame, 30 x 36 in. wooden frame and 30 by 36 in. copper frame. The exposure tests are essentially tests to determine the resistance of the various types to atmospheric corrosion and to the effect of wind. Each type of cloth will be submitted to a chemical analysis and physical tests and also to an accelerated salt spray test. At the meeting in Philadelphia the details of this entire test program were completed and arrangements made for the actual installation of the samples. Inspection of these screens will be under the direction of the U. S. Bureau of Standards.

Sub-Committee, of Committee E-1, on Impact Testing

Chairman: E. B. Smith, Engineer, Bureau of Public Roads, Washington, D. C.

Secretary: R. E. Hess, Assistant Secretary, American Society for Testing Materials, Phila.

The Sub-Committee on Impact Testing, of Committee E-1 on Methods of Testing, held a meeting on March 18 to give consideration to the possibility of preparing a recommended practice of impact tests of metals. It was pointed out that the impact test although not yet standardized, was being used for a variety of purposes and for a number of materials. The opinion was accordingly expressed that it might be well to have a recognized recommended practice which could be used as a relative test and that further research might result in the preparation of a fundament test. It was recognized that there were considerable data of value on record in the printed papers that were presented at the symposium on Impact Testing held at the annual meeting of the Society in 1922, appearing in Part II of the Proceedings for the year. Much could be gained by making this material more readily accessible. It was accordingly decided to make a thorough analysis of this Symposium and give in summarized form the general conclusions that could be drawn from statements there made as to the present status and possibilities of the impact test. This statement could be amplified in the light of the experience of the members of the committee.

The analysis of the Symposium might make evident along what lines the information is lacking and the most fruitful lines of research that should be carried out. A committee was appointed to lay out a program for a comprehensive research, which plan should be laid before the Society's Committee on Correlation of Research. If the complete program discussed at the meeting is carried out this will probably result in one of the largest research programs ever conducted by the Society.

MEETING HELD THURSDAY, MARCH 19

Joint Research Committee on Effect of Temperature on the Properties of Metals

Chairman: G. W. Saathoff, Chief Construction Engineer, Henry L. Doherty and Company, New York City

The installation of the increasing number of power plants operating at high temperatures and pressures has demonstrated the need for authentic information on the effect of both high and low temperatures on the properties of metals. At a joint meeting of the American Sociey for Testing Materials and the American Society of Merchanical Engineers held in Cleveland in May, 1924, the need of a further investigation of this subject was clearly developed and there has been formed under the joint auspices of the two societies a joint research committee, of which the following are the members:

G. W. Saathoff (Chairman), Chief Construction Engineer, Henry L. Doherty and Company, New York City.

G. K. Elliott, Chief Chemist and Metallurgist, The Lunkenheimer Company, Cincinnati, Ohio.

H. J. French, Physicist, U. S. Bureau of Standards, Washington, D. C.

J. B. Johnson, Chief, Material Section, Engineering Division, Air Service, McCook Field, Dayton, Ohio.

V. T. Malcolm, Metallurgist, Chapman Valve Manufacturing Company, Indian Orchard, Mass.

J. A. Mathews, Vice-President and Metallurgist, Crucible Steel Company of America, New York City.

L. W. Spring, Chief Chemist and Metallurgist, Crane Company, Chicago, Ill.

Three objects are to be accomplished by this committee: (1) Accumulation of existing unpublished data covering satisfactory and unsatisfactory service in different fields of engineering of various materials under high tempera-

tures; (2) the making of studies leading to standardization of the procedure for testing materials at high and low temperatures; and (3) outlining and fostering new research work in this field. Among the first and most important materials to be investigated are carbon and alloy steels, so-called "heat-resisting" alloys, consisting of various combinations of nickel, chromium, iron, tungsten, etc., and trimming materials (chiefly alloys of nickel and copper) for valves and equipment intended for high temperature service in power stations, oil refineries, etc.

At the meeting the Joint Committee discussed the details of their test program and methods of financing the committee's work. The committee will invite the co-operation of a number of laboratories in conducting the tests.

Committee E-4 on Metallography

Chairman: H. C. Boynton, Metallurgist, John A. Roebling's Sons Company, Trenton, N. J.

Secretary: G. F. Comstock, Metallurgical Engineer, Titanium Alley Manufacturing Company, Niagara Falls, N. Y.

Committee E-4 discussed at its meeting the recent development in the study of metals by the use of the X-ray in which the value of this method of analysis in studying the nature and arrangement of the minute constituents of metals was emphasized. A sub-committee under the chairmanship of Dr. Zay Jeffries of the Aluminum Company of America is engaged in the preparation of recommended practice for making such examinations, and it is expected that this will be a feature of the committee's report to the Society in June.

Another sub-committee under the chairmanship of W. E. Ruder of the General Electric Company reported recommended practice for thermal analysis of steel which the committee has accepted for presentation to the Society in June. This recommended practice specifies the apparatus including specifications for a furnace, specimens, rate of heating, cooling and interpretation of the thermal curves obtained.

The committee is also doing some work in the field of standard definitions.

Committee B-1 on Copper Wire

Chairman: J. A. Capp, Chief of Testing Laboratory, General Electric Company, Schenectady, N. Y.

Two important matters were discussed by this committee, namely, the development of specifications for high-conductivity copper trolley wire and of specifications for high-strength low-conductivity bronze trolley wire. The committee has co-operated with the American Electric Railway Engineering Association, in which are represented the electric railways, the principal users of trolley wire. W. H. Bassett, Technical Superintendent, American Brass Company, Waterbury, Conn., heads of the A.S.T.M. representation on a joint committee of the two societies, and H. S. Murphy, of the Philadelphia Rapid Transit Company, heads the corresponding group of the American Electric Railway Engineers' Association. The Conference Committee reached an agreement on specifications for copper trolley wire and the specifications were approved at the meeting of Committee B-1 and will be offered to the Society at the annual meeting in June for adoption as standard. It is expected that the A.E.R.E.A. will take similar action at their annual convention in October so that the two societies will have identical specifications for this important product.

Similarly, conference work is under way in the consideration of specifications for high-strength bronze trolley wire. Development of these specifications has not progressed as far as those for copper wire. At its meeting Committee B-1 discussed the detail of the technical requirements of the specifications.

There was some discussion of the specifications for hard-drawn, medium hard-drawn and soft copper wire in their relationship to projects that are under the sponsorship of the American Engineering Standards Committee.

Committee B-3 on Corrosion of Non-Ferrous Metals and Alloys

Chairman: E. C. Lathrop, Vice-President, Samuel P. Sadtler and Son, Inc., Philadelphia, Pa.

Secretary: Sam Tour, Metallurgist, Doehler Die Casting Company, Batavia, N. Y.

The meeting of this committee was devoted essentially to a critical review of the test program announced by this committee at the annual meeting of the Society last June. This includes the making of four types of accelerated corrosion tests on samples of nickel, zinc, lead, copper, aluminum and admiralty metal. The tests are total immersion, alternate immersion, spray and accelerated electrolytic tests. Six solutions will be used, namely, sodium chloride, hydrochloric acid, acetic acid, sodium hydroxide, ammonium hydroxide and potassium dichromate. The necessary material has already been prepared and a number of preliminary tests have been made, which have revealed the necessity of some modifications in the detailed procedures that were originally specified. With these ironed out, the committee expects to begin actual test work very soon.

While the primary object of these tests is to compare and evaluate the various types of corrosion testing, there will be obtained incidentally thereto a large amount of data on the relative resistance to corrosion of these various metals in the several solutions.

Committee B-2 on Non-Ferrous Metals and Alloys

Chairman: William Campbell, Howe Professor in Metallurgy, Columbia University, New York City

Secretary: P. D. Merica, Director of Research, International Nickel Company, New York City

This committee held a well-attended meeting at which a number of sub-committee reports were received and the work of the committee for the year reviewed.

W. H. Bassett, Technical Superintendent, American Brass Company, Waterbury, Conn., reporting for Sub-Committee I on Pure Metals in Ingot Form, recommended revisions in the shapes and sizes of copper wire bars, which were accepted and will be recommended for publication as tentative at the annual meeting in June. Mr. Bassett also stated that the committee expects to present a paper discussing the situation with respect to specifications for antimony.

W. R. Webster, Vice-President, Bridgeport Brass Company, Bridgeport, Conn., recommended for Sub-Committee II on Wrought Metals and Alloys, that the Society's Specifications for Muntz Metal Condenser Tubes and Brass Condenser Tubes be adopted as standard. This recommendation was approved and will be acted upon by the Society in June. Some progress was reported on the subject of condenser tube plates.

C. H. Clamer, President, Ajax Metal Company, Philadelphia, reported the probability of co-operative work with the American Railway Association respecting Specifications for Non-Ferrous Alloys for Railway Equipment.

Sub-Committee VIII on Aluminum Alloys, Cast and Wrought, recommended a revision of the Society's Specifications for Light Aluminum Casting Alloys. It is the expectation of the sub-committee to prepare new specifications for aluminum base casting alloys in ingot form.

Consideration has also been given to the development of specifications for high strength casting alloys.

Committee A-5 on Corrosion of Iron and Steel

Chairman: J. H. Gibboney, Chemist, Norfolk and Western Railway, Roanoke, Va.

Secretary: James Aston, Metallurgist, A. M. Byers Company, Pittsburgh, Pa.

Committee A-5 on Corrosion of Iron and Steel held a well-attended meeting with 32 members and visitors present. In the absence of the chairman, J. H. Gibboney, who was unavoidably detained in Roanoke, H. E. Smith, Engineer of Tests, New York Central Railroad, New York City, presided.

At its meeting the committee received a comprehensive report from Sub-Committee VIII on Field Tests of Metallic Coatings, presented by its chairman, F. A. Hull, Chemist, General Electric Company, Schenectady, N. Y. Within recent years much attention has been paid to the coating of iron and steel with various non-ferrous metals, such as zinc, lead, tin and copper. There has been a growing demand for authentic comparative data on the relative resistance of various metallic coatings to corrosion under various media, such as atmospheric corrosion and corrosion under various kinds of water. Reliable estimates based upon Department of Commerce census of steel production, and the recent paper on "Corrosion of Ferrous Metals" by Sir Robert Hadfield presented before the Institute of Civil Engineers in London in 1922, indicates that the world's rust bill is annually in the neighborhood of $1,500,000,000. Accordingly much economic importance attaches to any study, the results of which will help to overcome this great economic loss, and Committee A-5 is planning an investigation of metallic coated products on a correspondingly large scale.

Since the annual meeting of the Society in June, Mr. Hull's sub-committee has been diligently at work in the planning of these tests on metallic coated products. At the meeting of the committee on Thursday a program was adopted which involves the following main features:

1. Exposure of material to be tested at five strategic localities.
2. Chemical and physical analysis of samples of the material exposed.
3. A study of accelerated corrosion tests with the object of finding that method which will most nearly check long-time exposure results, and applying such method as a parallel series of tests on the metallic coated products to be subjected to atmospheric exposure.

The products to be exposed are galvanized sheets, galvanized wire, galvanized fencing, structural shapes, hardware, pole line material, tubes, castings, and lead and terne plate. Mr. Hull's sub-committee has completed the plans for galvanized sheets, wire and fencing, and these plans have been approved by Committee A-5 and the work ordered to proceed.

Substantial progress was reported on the program for structural shapes, hardware, pole line material, tubes and castings, each of which are to be tested with the following coatings: Hot dip galvanizing, sherardizing, electro zinc plating, cadmium plating, sprayed sinz, aluminum dip, calorizing and lead dip. Progress was also reported on the program for exposure of lead and terne plate.

Galvanized Sheets.—The sheets will be 22 gage, 26 in. wide after corrugation, and 9 ft. long. From these sheets the necessary samples will be taken for laboratory, spot and bend tests, for outdoor exposure and for accelerated tests. The bare material will be representative of commerical steel and iron made by the basic open-hearth process. Two grades of each type will be used, one containing 0.05 maximum copper and the other added copper of 0.20 minimum. Zinc used for galvanizing is to be in accordance with A.S.T.M. Specifications for Prime Western Zinc. Five weights of coating will be used, namely, 2½, 2 and 1½ oz. per square foot, coating of minimum average weight of 1¼ oz. per square foot, and a coating from ¾ to 1 oz. per square foot, to be known as tight coated material. Thirty inch corrugated sections will be exposed on the test racks, and in addition corrugated sections of uncoated sheets of each base material will be exposed for comparison. The test will include exposure of severely bent specimens of the various steels.

Wire.—Seventy samples of strand wire are to be exposed, each sample being 21 ft. 6 in. long.

The tests of wire include common strand, Siemens-Martin strand and extra high strength strand, each with four weights of coating. The committee has written detailed specifications for the base material and the galvanizing for each type strand. Wire galvanized by the hot dip process, hot dip process with subsequent heat treatment, hot dip process on wire given a preliminary carbonization before galvanizing, electric galvanizing wire process are included. The series will include tests on line wire 0.165 in. after galvanizing with four weights of coating and the several processes of galvanizing above mentioned. The base metal in the line wire includes basic open-hearth steel without added copper, basic open-hearth steel with added copper, and basic open-hearth iron.

Fencing.—Thirty-two samples of woven field fence and chain link fence are to be exposed. Woven field fence will be manufacturers' standard fence woven after galvanizing, No. 9 gage wire, 39 in. high. Four weights of zinc coating will be used. Base material will be basic open-hearth steel without added copper, basic open-hearth steel with added copper, and basic open-hearth commercial iron. Chain link fence will be manufacturers' standard No. 9 gage wire galvanized after weaving, of the same three basic materials. Physical properties of the coating and the specifications for zinc are to conform with the specifications of Committee A-5 for galvanized products.

Test Racks.—Detailed specifications have been prepared for testracks. The posts are to be of reinforced concrete and all truss and purlin members of the racks will be of hot dipped galvanized material held together with hot dipped galvanized bolts. The racks for the wire products will consist of reinforced concrete posts and creosoted wooden members supported by hot dipped galvanized braces. For the exposure of woven wire fence, reinforced concrete posts will be erected on approximately 12 ft. centers, and if desired by any manufacturers, standard galvanized posts may also be used.

Upon the recommendation of Sub-Committee VI on Specifications for Metallic Coated Products, under the chairmanship of H. E. Smith, Engineer of Tests of the New York Central Railroad, the committee will recommend to the Society in June that existing specifications for galvanized sheets be extended to include lighter gages, Nos. 24 and 26, in the heavy coated class. Specifications are being considered for tight coated sheets carrying from ¾ to 1 oz. of zinc per square foot. Progress is being made in the consideration of specifications for galvanized wire, for sherardized castings and for black base metal intended for zinc coating. Proposed simplification of practice, involving the elimination of some odd gages, is being studied with the Division of Simplified Practice.

At the meeting two interesting papers were presented by committee members; one by J. L. Schueler of the Keystone Steel and Wire Company, Peoria, Ill., on Methods of Zinc Coating Iron and Steel Articles, and the other on a quick-time test which reasonably parallels the order of failure of the bare metal sheets exposed at Pittsburgh.

The Production of Copper-Calcium Alloys

Translated for The Metal Industry from an Article by Friedrich Otto Bensel in Metall und Erz

By R. E. SEARCH,
Exchange-Research Editor

Since the chemical behavior of calcium in its deoxidation of metals appears to be especially promising, there has been undertaken recently a series of experiments in such a direction with reference to various alloys. These were partly miscarried in their practical application because calcium, used in its metallic, virgin state is so easily oxidized. In the deoxidation of the metal bath, on account of its low specific gravity, calcium floats on the surface, where it is burned up before it can act as a reducing agent. If, however, the metal is used in an alloyed state, then a homogeneous solution is possible and effective. The alloy dissolves quickly and its reducing power is immediate.

The method used for producing copper-titanium alloys in the electrochemical way by employing a molten bath of fluorspar as an electrolyte, points out the path to be followed in making copper-calcium alloys. (The equilibrium diagram of Cu-Ca has been investigated by Donski, only in the region of pure copper; compare also Borneman, Die Binaren Metallegierungen, Teil 1).

The electrolysis is undertaken with pure fluorspar, with as much copper chloride (pure $CuCl_2$ with 47/25 per cent Cu.) which, according to the electrochemical equivalent, would permit the copper contained to be separated, in five minutes. As perhaps one half of the whole work is done by the current the arrangement stands for the separation of the calcium from the electrolyte, i.e., (CaF_2).

The use of copper chloride (or later, cuprous chloride), in place of copper fluoride, aims at the possibility of getting the same or better results with copper chlorine combinations. With this, the curcumstance should be taken into consideration, that with the chlorides the alloy can be made with greater ease and with less cost than by the use of the fluoride. The experiment proceeded without any disturbance, with approximately complete constancy of the amperage and pressure whilst the entire time consumed amounted to five hours. The result was a material that was not completely fused together. It consisted of three parts, which were easily distinguished from one another by their differences of color. The deposit on the copper cathode was in layers, in such a manner that the part richest in copper was deposited directly at the pole, and the part poorest in copper, at the periphery.

The analytical results were as follows:

1. Copper colored material	Cu. 91.85%, Ca— 7.81%
2. Grayish yellow metal	Cu. 67.23%, Ca—29.32%
3. Gray, shining metal	Cu. 41.38%, Ca—58.43%

The layer separations of these different copper calcium alloys are evidence that the bath temperature at the cathode was not high enough to obtain the separation of the metal in a fluid state, which shows distinctly that during the course of the electrolysis, with reference to the separation of the calcium, this continuity had increased up to the end of the process.

Supported by further observations (addition of $CaCl_2$), it is easy to understand that this condition is to be traced back to a too violent evolution of chlorine from the added copper chloride (52.75% Cl) and a consequent strong saturation of the electrolyte with the gas (active whirling of the bath). Insofar as by this means, a part of the already separated calcium is slung off by the wave of revolution in the bath, shoved from cathode, it was conducted through calcium chloride, and showed the experiment to be feasible. The already used fluorspar was displaced by an abundant quantity of calcium chloride (about 30% of the whole electrolyte) and the electrolysis carried out with it. In order to lessen the amount of chlorine given off cuprous chloride, CuCl (60% Cu) in place of the copric chloride,—$CuCl_2$ was added.

Proportionately at the beginning it shows that the strength of the current going through the bath, compared to that of the former experiments, at constant pressure, was significantly higher (550 amp. to 350 amp.). This is traceable only to a greater conductivity of the electrolyte ($CaF_2 + CaCl_2$). Naturally it increases with it according to the bath temperatures and the fluidity of the melt which both require for the formation of a well-melting homogeneous metal alloy. Thanks to these conditions the material brought out amounted to 1.39 kg in two-and-one-half hours of the research. It was a copper calcium alloy which fulfilled all requirements sufficiently, a complete, homogeneous, white and bright glittering material of the following composition:

Cu	= 70.40%	
Ca	= 23.32%	Total 97.55%
Fe	= 1.91%	
Si	= 1.91%	

This alloy showed an extraordinery tendency to oxidation in the air and reacted with water in a lively manner at ordinary temperatures with evolution of hydrogen. (With dilute nitric acid it burns accompanied by sparks). Although later a further experiment was made with the use of copper fluoride in place of the cuprous chloride, with retention of the same electrolyte ($CaF_2 + CaC_2$) which gave a copper calcium alloy with:

Cu	= 83.76%	
Ca	= 14.49%	Total 99.01%
Fe	= 0.76%	

This furnished an immediate, favorable result, and proved, by the small quantity of calcium obtained, that in the electrolytic preparation of such alloys, the addition of the copper (Cu_2Cl_2) as well also as the calcium ($Ca\ Cl_2$), in the form of chlorides appear to be advantageous.

The most favorable process, economically, is therefore represented by the cuprous chloride and calcium chloride in an electrolyte consisting of fluorspar and calcium chloride.

Some Experiments on the Abrasion of Metals

K. Honda and R. Yamada*

The amount of wear under different frictional horsepower and under different coefficients of friction was measured with respect to soft metals and carbon steels. In these metals the amount of wear is proportional to the frictional horse-power, provided that the coefficient of friction is constant. Under a constant frictional horsepower the amount of wear of these metals and steels increases with the coefficient of friction. The effect of the velocity of abrasion on the amount of wear is negligibly small in the range of velocity investigated.

*Abstract of a paper read at the meeting of the British Institute of Metals, March 11-12, 1925.

Segregated 88-10-2 Alloy

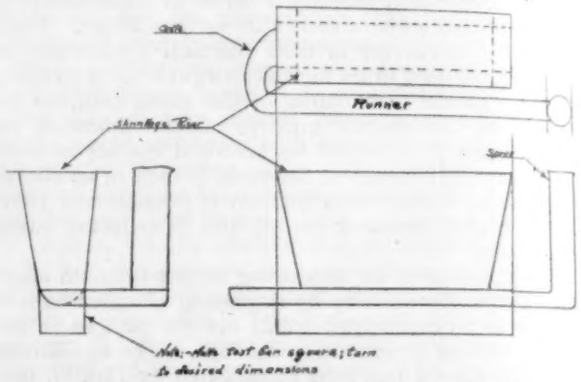
Q.—We are making some work for the Government, which calls for 33,000 pounds tensile strength and 14 per cent elongation in 2 inches and have been trying to make the work out of 88 copper—10 tin—2 zinc. While we have no trouble in getting nice, clean, sound castings, the test bars have only been showing an average of about 27,000 pounds tensile strength instead of not less than 33,000 and in a few cases, they have pulled 38,000 to 40,000, but the elongation has not run over 7 per cent to 10 per cent, instead of 14 per cent.

We have used nothing but the best virgin metals, viz:—Electrolytic Copper, Strait's Tin and Horsehead Zinc and have melted the metal carefully under charcoal in a crucible pit furnace and have poured the test bars hot, medium and dull. Some of them were cast on end and others were cast flat, but the results appear to be about the same in all cases. I have also used fluxer, but with all the precaution and care exercised, cannot meet these requirements.

I am mailing you a few of the broken test bars for your inspection and if you can give any information as to how to meet these specifications, I will appreciate it.

A.—On examination of the broken test bars, we find shrinkage and segregation. We are of the opinion in the first place, you are not feeding and gating your test bars properly and suggest you gate and riser your test bars as per sketch.

Also use as you state, the best material and melt your copper first. If the melting is done in crucibles, do not place any of the ingots around the pot on top of the coke, as is sometimes done to hurry melting in the foundry. Place all your copper in the crucible and melt as quickly as possible. Get copper good and hot, and add the tin a little at a time. Just before adding the tin, add ¼ per cent of 15 per cent phosphor copper, and ¾ per cent of



GATING TEST BAR FOR 88-10-2 MIXTURE

30 per cent manganese copper. Stir well before adding the tin, which should be done a little at a time and stirred; then add the zinc; let stand a few minutes before pouring.

If you will follow these instructions you will have no trouble meeting the specifications required.—W. J. REARDON.

Frozen Motor Bearings

Q.—We are experiencing considerable trouble within the last three months with frozen bearings in our motors. We have checked up on a number of cases and find that the trouble is found always in the same place. We are unable to lay our hands on the cause of this trouble and to help us out are sending you two bearings. The one marked No. 1 has been in use for 10 years and indicates hardly any wear. The one marked No. 2 is a new bearing just turned up from the last lot of bronze furnished us.

We should like to have you make an analysis of both of these bearings and advise us if there is any difference in the two metals; also if you can suggest anything to overcome the trouble of frozen bearings. We have never had so much trouble before and have been put to quite an expense in making replacements, besides losing several customers on account of this difficulty.

The bearing marked No. 1 analyzes approximately 94% copper, 5% tin and 1% zinc. The other one analyzes 80% copper, 7% tin, 10% lead and 3% zinc.

The first mixture mentioned above would make a very tough metal, but we have always contended that a certain percentage of lead in a bearing improved the bearing qualities. We find, however, that some people do not agree with us, although a great many authorities feel that lead should be a part of all bearing metal.

We are enclosing some other correspondence which may help you to understand this matter. Which mixture should give the best results?

A.—There are a good many things that might cause the trouble.

The motor builder claims that no change has been made in the design of the shaft. Has there been a change made in relation to taking the power from the shaft so as to create more pull or lateral tension on the side of the bearing and shaft? Since the trouble always occurs in the same place, it would appear as if that part of the bearing and shaft were being overloaded.

We assume there is plenty of end play to the rotor (so-called magnetic center play), when these motors are sent in their proper places on the washing machines.

Some of the gears used on washing machines are very crude affairs, many of them having cast teeth. A motor, driving such a pair of gears, unequally balanced, would be apt to show fatigue in the bearings. However, this would not cause the trouble to occur always in the same place, unless all the trouble occurred on this particular washing machine.

Now as to metal, No. 1 might have been fluxed with phosphorus and this flux might be a good thing for No. 2 also. No. 2 made from virgin metal should make a good bearing metal, but after being re-melted several times, as occurs in ingot metal, the softer metals become oxidized. Lead, particularly, hardens during successive re-melts and loses its ductility and virtue as bearing metal. It would appear, since you have been using No. 2 mixture for a period of years with success, that your trouble is in the ingot. While it may analyze correctly, the metals may be worn out or burned out.

We note that you use bars. Improper gating on long bars might create just enough trouble to give you this worry.

More copper would make a stronger metal; say 85 per cent coper, 7 per cent tin, 5 per cent lead, 2 per cent zinc, 1 per cent antimony. Antimony has a tendency to open the grain of the metal and therefore holds the film of oil better than a hard glassy surface. Lead as a virgin metal does make a good combination with copper for bearings, but it should not be re-melted often.—W. L. ABATE.

British Institute of Metals

Abstracts of Papers Read at the Annual General Meeting in London, England, March 11-12, 1925

SURFACE ABRASION AS A POTENTIAL CAUSE OF LOCALIZED CORROSION

By Ulick R. Evans

Previous work has indicated that most cases of serious corrosion are of an electrochemical character; for electrochemical action usually gives rise to soluble primary corrosion products, whilst direct chemical oxidation would generally produce an insoluble body **in situ** on the metallic surface, which would tend to obstruct further attack. Bengough has indicated that local abrasion—by causing removal of the obstructive film—may allow local attack, whilst von Wurstemberger has suggested that very severe corrosion may be occasioned by electric currents flowing between the bare abraded portion and the still encrusted area.

An experimental investigation has been made regarding the existence of these currents. Sometimes they flow in such a direction as to localize corrosion on the small abraded portion, sometimes in the contrary direction. But they are generally transitors, dying away soon after abrasion ceases. Moreover the abrasion required to produce these currents must in most cases, be sufficient to damage the metal by mechanical erosion also. In the case of the corrosion of zinc by hydrochloric acid, the wiping away of the black scum of residual impurities (lead, etc.) actually diminishes the rate of attack; the impurities, if allowed to accumulate, act as the cathodic members of the corrosion-couples and facilitate the liberation of hydrogen. Vernon's statement that commercial (impure) zinc is attacked more slowly than some grades of much purer zinc is, however, confirmed; probably "homophase" impurities (in solid solution) behave in the opposite mode to "heterophase" impurities (present as a separate phase).

A METHOD OF IMPROVING THE PROPERTIES OF ALUMINIUM ALLOY CASTINGS

By S. L. Archbutt

The experiments described in this paper and the results obtained from them are to be regarded as indicating the possibilities of a method of treating aluminum and certain of its alloys, which serves to eliminate at all events a considerable proportion of dissolved gas and thus reduces unsoundness, and to a considerable extent removes pinholing. The process suggested consists in allowing the molten alloy or metal to cool slowly in the crucible in the furnace, until it has just completely solidified; it is then remelted, and may be carefully stirred, raised to the pouring temperature, and cast. Ingotting the metal is not satisfactory, as the ingots cool too quickly, and during remelting are too much exposed to the furnace gases.

In a later experiment described, passage of an inert gas through the melt during slow cooling and solidification has been found to improve still further the soundness of resulting sand-cast bars.

Slightly anomalous results have been obtained in some cases, and it is not yet clear how far the method is of value in other alloys, whether consisting mainly of aluminium or of other metals. It is evident that much further investigation is required. Meanwhile, the author has learned that simultaneously and independently Professor C. A. Edwards and Mr. W. E. Prytherch of Swansea, working on the effect of gases in copper (for the British Non-Ferrous Metals Research Association) have discovered a similar effect obtained by solidification in the crucible in the case of pure copper.

THE EFFECT OF GRAIN-SIZE UPON HARDNESS AND ANNEALING TEMPERATURE

By H. T. Angus and P. F. Summers

It is shown that the grain-size of a metal just before rolling considerably affects its hardness when annealed after rolling at temperatures up to the recrystallization temperature. It is well known that many heavily worked metals increase in hardness on annealing for a short time at relatively low temperatures, and this property is shown to depend, among other things, upon the grain-size that existed at the time of rolling. A coarse grain-size increases this rise in hardness and the range of temperature over which it extends, whereas with a fine grain-size, softening may commence at much lower temperatures. This effect was noted in both pure copper and bronze containing 4.5 per cent of tin. It was also observed that the recrystallization temperature of copper is higher in the course-grained metal than in the fine-grained, in which almost complete softening occurs before signs of recrystallization appear; while in the course-grained copper, the same degree of softening is only reached when complete recrystallization occurs.

The relation between grain-size and hardness for copper and bronze shows that as the grain-size increases after recrystallization the hardness decreases correspondingly. It was found by calculating the area of grain boundary per cubic milimeter of metal from the grain-size, and plotting against hardness a straight line was obtained, indicating that the hardness varies directly with the area of grain boundary per unit volume of metal.

THE INFLUENCE OF EMULSOIDS UPON THE RATE OF DISSOLUTION OF ZINC IN SOLUTIONS OF LEAD, NICKEL AND COPPER SALTS

By J. Newton Friend and J. S. Tidmus

Experiments carried out since 1921 have shown that the presence of emulsoids, such as gelatin, starch, etc., exerts a marked retarding influence upon the course of many chemical reactions, such as the rate of solution of metals in acid, the corrosion of metals, the rate of solution of salts in water, and of iron in aqueous solutions of inorganic salts, such as lead acetate and copper sulphate. The results appeared to justify the enunciation of a general law of retardation, according to which:—

Emulsoids tend to retard the velocity of such reactions, whether chemical or physical, as involve a change of state from solid to liquid, or vice versa, **in one or more of the components.**

This retardation is, in the main, due to adsorption; that is, it is a surface phenomenon, a thin layer of the emulsoid collecting upon the surfaces of the solid reactants thus impeding their chemical activity.

The present paper is more particularly concerned with the rate of dissolution of zinc in lead acetate, nickel sulphate and copper sulphate solutions, under varying conditions, and it is gratifying to note that the results harmonize with those previously obtained, and confirm the retardation law.

One result of considerable interest is the fact that the retarding action of the emulsoids frequently falls off markedly with rise of temperature. This is of practical importance as illustrating the fact that the remedies which yield satisfactory protection to metals at ordinary temperatures will not of necessity prove equally efficient if the temperature is raised.

COMPARATIVE TESTS ON SOME VARIETIES OF COMMERCIAL COPPER ROD

By T. G. Bamford

The primary object of the research was to compare the properties of certain distinctive varieties of commercial copper, with a view to ascertaining their relative durability under conditions which they would meet in service, particularly as constructional parts of locomotive fireboxes. Three deoxidized and two "tough-pitch" coppers were tested. Of the former, the first contained 0.31 per cent, the second 0.53 per cent of arsenic, while the third contained 1.5 per cent of nickel and but a trace only of arsenic. Of the "tough-pitch" copper one contained a trace of arsenic, while the other contained 0.45 per cent of this element.

It was found that the phosphorus present in commercial copper which has been deoxidized with this element does not impair the mechanical properties of the metal. Three lots containing up to 0.2 per cent of phosphorus were extremely strong, quite ductile, and more resistant to alternating stresses than "tough-pitch" varieties which were free from phosphorus. Deoxidized low arsenical, high arsenical, and 1.5 per cent nickel-copper containing up to 0.014 per cent of oxygen withstand severe gassing treatment, which would ruin "tough-pitch" metal. Deoxidized copper containing 1.5 per cent of nickel is more resistive to harmful influences arising from severe heating in either reducing or oxidizing atmospheres than are either "tough-pitch" (arsenical or non-arsenical) or deoxidized arsenical coppers. Actually, the tensile strength of this nickel-copper is vastly improved, its hardness greatly increased, no brittleness is developed, and it preserves a high ductility after severe gassing treatment.

The nickel-copper containing 1.5 per cent metal oxidizes less rapidly than any other variety tested. The "tough-pitch" and the deoxidized varieties, not containing nickel, oxidize approximately to the same extent, but when the "tough-pitch" varieties scale the oxide penetrates into the metal—more particularly so in the case of non-arsenical "tough-pitch" copper, on which a very rigidly adherent scale is formed. It follows that "tough-pitch," non-arsenical copper will give most trouble in hot-working operations where it is desired to avoid entanglement of scale in the metal. The resistance which 1.5 per cent nickel-copper possesses to gassing, as well as its augmented hardness and strength resulting from high-temperature treatment, render it very siutable for engineering, and particularly for locomotive parts.

THE ALPHA PHASE BOUNDARY IN THE COPPER ZINC SYSTEM

By R. Genders and G. L. Bailey

In view of evidence indicating inaccuracies in the position of the alpha phase boundary as given by Shepherd and modified by Matthewson and Davidson and others, the authors undertook complete revision of this portion of the diagram. The method adopted was that of quenching the alloys, after annealing to equilibrium, at successive intervals of 20°C. in the neighborhood of the phase boundary. Subsequent micro-examination was made to determine the lowest temperature at which traces of beta appeared, and these temperatures were determined over the range 61.1 to 67.7 per cent copper on seven alloys at intervals of approximately 1 per cent copper. The preliminary annealing of the alloys to all alpha presented no difficulty where the copper content exceeded 62 per cent, but the long annealing required for alloys of lower copper content was avoided by first quenching the specimens in the beta range and reannealing at 450°C., at which temperature equilibrium was reached within a short period, one hour in the case of the 61.1 per cent alloy. The data obtained from this work require a movement in the solubility line to the right of that given by previous workers. At 470°C. the boundary reaches a low limit of concentration of copper at approximately 61 per cent, and this figure seems to be unaffected to any appreciable extent by further fall in temperature. Above 470°C. the solubility decreases with rise in temperature and the junction of the alpha boundary with the solidus is shown at a concentration of 67.5 per cent at a temperature in good agreement with Parravano's determination of the peritectic temperature at 905°C. The commencement of the peritectic transformation at 67.5 per cent copper is confirmed by a determination of the solidus for an alloy containing 70 per cent copper, which showed traces of liquid at about 913°C.

THE INFLUENCE OF LEAD AND TIN ON THE BRITTLE RANGES OF BRASS

By Denis Bunting

The influence of two impurities, lead and tin, on the brittle ranges of brass has been investigated. It was found that the chief effect of lead was mechanical; the brittle range in itself was not affected, but masked owing to the embrittleing effect at other temperatures of the lead which segregated as globules to the grain boundary. β brass was very susceptible to this deleterious effect; $\alpha + \beta$ brass was also affected, but not to the same extent, whilst α brass appeared to be immune from this intercrystalline weakness caused by small percentage of lead.

The effect of tin can be considered under two headings: tin in solution, and tin in excess of the solubility limit. Tin in excess of the solubility limit produced extreme brittleness owing to the production of the brittle gamma or delta constituent. The effect of tin in solution appeared to be connected with an increase in crystal rigidity. The β & $\alpha + B$ (β matrix) brasses were rendered more brittle at low temperatures, and the brittle range so increased, whilst the impact strength of the α & $\alpha + \beta$ (α matrix) brasses was improved, and so the brittle range is consequently decreased.

THE REMOVAL OF RED STAINS FROM BRASS

By E. A. Bolton

Various considerations affecting the oxidation and staining of brass are reviewed and the author's earlier work is confirmed, and, in addition, the difficulty of avoiding staining with brass of high copper content is described. The theory of staining occurring by reaction between cupric oxide and the pickling acid is described and attributed to concentration cell action. Electrochemical difficulties in stain removal are shown. Attention is turned to the use of solutions containing sulphuric and nitric acids for stain removal. While such solutions show some possibility of success, results are not so favorable as those obtained with solutions of dichromate and sulphuric acid. The action of these solutions is explained and described in detail and as a result of the research, details are given suitable for the development of the process upon the industrial scale.

THE DENSITY AND CONSTITUTION OF THE INDUSTRIAL BRASSES

By G. L. Bailey

Values have been obtained for the crystal density of the brasses in equilibrium over the range of composition used industrially. The effect of coring in α brasses on the net density appears to be negligible; the alloys which contain β in the chill cast state, however, have a small range of

variable density due to the difference in density between α and β and the density of sound castings may vary according to the amount of β produced by the particular conditions under which the alloy was cooled from the liquid state to temperatures within the region of 450°C.

An alloy always consisting entirely of β is unaffected in density by heat-treatment, and it is apparent that whatever the nature of the transformation at 470°C., either there is no accompanying volume change, or the transformation is not suppressed by any ordinary method of quenching.

The differences which have been observed by Bamford and other workers between the densities of sand- and chill-castings are considered to be due to the presence in the sand castings of fine porosity consisting of interdendrital cavities.

A phenomenon not previously observed by the authors in any alloy, consisting in a reduction of density, due to unsoundess accompaying constitutional change (β to α), has been found to occur in the brasses over a considerable range of composition. The unsoundness produced is removable either by reversing the constitutional change (as by quenching) or by mechanical compression.

From a practical point of view it is of particular interest that heat-treatments, involving quenching of the α β brasses and a small range of the α brasses, may give rise to internal stresses of considerable magnitude, consequent on constitutional changes taking place during quenching. The cracking of heat-treated articles which sometimes occurs appears to be attributable to constitutional volume change rather than to the difference between the expansivities of the different constituents.

ON THE DENSITY OF RHODIUM

By Sir Thomas Kirke Rose

Two specimens of Rhodium were kindly prepared by Messrs. Johnson & Matthey for the purposes of the investigation, one being forged up from sponge and annealed but not melted, and the other melted from sponge in the oxyhydrogen blowpipe and forged while hot. The Rhodium sponge was chemically pure.

The density of the melted specimen was found to be 12.47 in vacuo at 0°/4°, but the other specimen was evidently not free from internal cavities as its density was only 12.22.

Previous determinations by other observers had given 12.1 to 12.6, but were unsatisfactory owing to various causes.

Metal Work of Armenian Boys

Written for The Metal Industry by MABELL S. C. SMITH, Near East Relief

In the largest orphanage in the world, that maintained by Near East Relief at Alexandropol in Armenia, there is a fourteen year old boy who is a real mechanical genius. He has made a four-foot high automobile that goes. Made, not assembled. Almost every part he constructed by hand—the one-cylinder engine, transmission, steering apparatus, two gears and rope tires. When given a teacupful of gasoline the little affair "picks it up" and snaps off down the road.

ORPHAN BOYS WORKING IN COPPER SHOP

Everybody in the orphanage is as proud as possible of this fabrication, not least the teachers in the machine shop where the youngster has learned all that he knows of metals and metal work. It is a practical shop producing all sorts of things needed for the running of the orphanage plant, but while the boys are making gearing, nuts, bolts, nails, hinges, automobile and tractor parts for immediate use they are learning the management of all sorts of power machines and are gaining a working knowledge.

A few years ago the relief workers were gathering in the starving, almost naked children from the roads and deserted villages of the war-stricken Near East. The first task was to feed and clothe them and cure their diseases. Though the consequences of malnutrition are of long duration the boys and girls are now, taken as a whole, in good health. The organization's present duty is the education of these children for self-support and to be the economic leaders of the countries in which they are to be citizens. To that end not only the domestic arts, knowledge of which is valuable to every father and mother of a family, are taught to all of them but in addition a trade or craft which will serve as a means of self-support. A considerable choice is offered. The metal crafts are among the most popular because they are known to offer a secure future.

As the orphanage at Alexandropol is the largest of those managed by Near East Relief so the machine shop described above is the most complete. But every orphanage where there are boys has metal work of some sort in its industrial department. On the island of Syra in the Aegean Sea the young tinsmiths are now making hundreds of tin cups from condensed milk cans, rolling the edges and soldering the handle. These cups are used in all the orphanages but a special consignment was sent to America for use at the teas and dinners preceding International Golden Rule Sunday, December 7, 1924, when the food was served in pottery bowls made by the orphans in Jerusalem and the drink in these milkcan mugs.

The Beirut boys specialize in brass and copper, turning out kitchen utensils, ornamented bowls, vases and lanterns. At Aleppo the tinsmithing and blacksmithing shops not only produce for the orphanage but do quite a rousing trade in the town. They make all sorts of tin utensils, large quantities of stove pipe, cradles, locks, iron chairs and even surgical operating tables.

Three Periods of American Silversmithing

A Series of Three Articles on the Development of Silversmithing in America. First, American Colonial Silver, 1620-1800; Second, American Silver of the Past 1800-1880; Third, American Silver of the Present 1880-1924.

First Period, American Colonial Silver, 1620–1800

Written for The Metal Industry by A. F. SAUNDERS, Designer Benedict Manufacturing Company

Silversmithing was one of the earliest arts practiced in America. It goes back to within a short period of the arrival of the Pilgrims at Plymouth. The first silver used in the Colonies was of English origin brought over by the early settlers. The first silversmith to land on our shores with intention of practicing his craft was John Mansfield, who came to Boston from London in the year 1634. This was but fourteen years after the Mayflower landed her first band of Colonists. From that time up to the present day, the craft has undergone a complete revolution, both in style and in the methods used in the making. Handiwork has been largely supplanted by mechanical processes. There have been times during this long period of transition when the craft as an art has suffered deplorably, yet in the end it has emerged to find itself grown into a strong, vigorous industry that America may well be proud of.

The silverware made by our colonial silversmiths as in the case of our early architecture and furniture, is thoroughly characteristic of the taste and life of America at that early period, simple and sturdy in design and construction, substantial in weight and, above all, representative of good craftsmanship. It reflects the classic mental attitude of a substantial people whose social conditions warranted no desire to imitate the elaborate styles in English plate of that time.

It is fortunate for the art of America, today, that the colonists as a whole were through necessity forced to patronize home talent. Otherwise, we should not now possess the splendid examples of old silver, furniture, glass, etc., which are just beginning to be fully appreciated by our art muesums and collectors.

Some confusion exists in this country regarding the term "Plate," which is the word generally used in England when referring to wares made of the precious metals. Previous to the practical application of the process of electro-plating in the early forties, the word "Plate" had the same meaning in this country as it had abroad, although so called "Sheffield Plate" had been made since the middle of the 18th Century. But this ware was always referred to as "Sheffield Plate." In late years the word "Silver" has come to be commonly used over here when referring to articles made of solid silver or "Sterling," as we have marked it since the stamping laws of 1894-96 became effective. When an article is made of some base metal and by mechanical means coated with silver, it is known as "Silver Plate" and should always be marked and referred to as such.

In England the usual term applied to a worker in the precious metals was "goldsmith" and we used the same designation here for over a century. The term "silversmith" came into use about the middle of the 18th Century and it is now invariably applied in both countries to workers in the white metal.

The silversmiths who made our early American silver were more than skilful craftsmen; they were artists in the full sense of the word. They were men of affairs in their respective communities, often holding positions of public trust. For example, John Hull and his partner, Robert Sanderson, two leading silversmiths of Boston in 1652, were both merchants of no mean ability. Hull was master of the mint, Sanderson his assistant and a deacon of the leading church. The name of Paul Revere is chiefly remembered through his midnight ride. This memorable event has earned him an immortal place in history, but has overshadowed his renown as one of the most eminent of early engravers and silversmiths. Many are the pitchers, bowls, cups, tea services and other articles made by him and still to be found in the homes of New England families. As a lieutenant of artillery he fought the French at Crown Point. He was first a major, and afterward lieutenant-colonel in a regiment of artillery during the Revolutionary War. Following his death in 1818 his son Joseph established the Revere Copper Company. Such was the kind of material of which our early silversmiths were made. These are but three of a long list of artist craftsmen to whom we men of the silver industry today owe much of our artistic inheritance, instinct, and inspiration.

It should be remembered that these Colonial craftsmen supplied silverware that was entirely handmade from start to finish, as there were no dies or mechanical tools in those days and what few tools they did use were of the simplest kind. There were no rolling mills to supply them with sheet metal, no spinning lathes upon which to form their shapes, no gas with which to melt their solder. They had to work out their own problems and their only sources of inspiration were the few samples of silver brought over from the mother country. It is well to know these interesting facts that we can better understand and more fully appreciate the intrinsic value of their product.

The various articles made by these early craftsmen were divided into three classes: ecclesiastical silver, used for religious purposes; domestic silver, for use in the home, and articles made for personal use. Church plate included flagons, chalices, patens, beakers, communion or standing cups and baptismal basons. For domestic use, tea and coffee services, including kettles and urns, tea caddies, sauce boats, punch bowls, loving cups, pitchers, mugs, saltcellars, castors or shakers, candlesticks and snuffers, brazers which correspond with the modern chafing dish, spoons, knives and forks of different kinds. Articles made for personal use were tobacco and snuff boxes, shoe and knee buckles, also toothpicks, either of gold or silver.

The Colonial silversmith conducted his business in a much different manner than his successors of more recent times. More often than not, his home was his workshop. He carried no stock on hand, except perhaps a few spoons, as there was a constantly growing demand for spoons. His wares were made to order, the metal usually being supplied by the customer in the shape of coins, the amount being determined by the requirements of the articles to be made. These coins were melted and run into a "skillet," rectangular in form, but thinner than an ingot, for the making of hollowware. The skillet was then hammered on a forging anvil into a sheet of the

required thickness. In the forming of a hollow body such as a cup, bowl or similar articles, a circle was cut with shears or saw, from the sheet of silver, its diameter being somewhat greater than the contour of the vessel desired. This circular sheet was then hammered with frequent annealings over a charcoal fire, until it took the form desired. "Beak Irons," anvils with long beaks, also "Stakes," small movable anvils of different shapes were used to reach the interior surface. Highly polished "Planishing Anvils" were used in the final finishing. This description is but a mere suggestion of how the early craftsman fashioned his wares, but it is indicative of how dependent he was upon his own abilities.

Two of the best known of the Dutch Colonial silversmiths were Anasuerus Hendricks and Peter Van Dyck. Hendricks was the earliest silversmith to locate in New York City, and like John Hull was a man of affairs, being appointed in 1686 to assist in giving the residents of the city a better water supply. He was intrusted with the care of the public well, a position of honor and responsibility, besides making much of the silverware for domestic use. He fashioned the silver spears, pikes and sword hilts for the militant burghers.

Peter Van Dyck was also a splendid craftsman of the Dutch school. He made much of the fine silver used in the New York of long ago. One of his tankards is

PLATE 1. TEA POTS

Many writers on this subject seem to overlook the fact that there were two distinct groups of silver made in the Colonies, one influenced by Dutch traditions and styles, the other by English. The Dutch group covers a space approximately from the years 1640 to 1710. In general design the work of these Dutch-American craftsmen was more massive, though fully as well executed as the work of their New England contemporaries. The Dutch styles ran more to heavy ornament, executed in relief by means of embossing and chasing, though many of the Dutch Colonial pieces are beautifully engraved.

That the "Niew Netherlanders" were hearty drinkers of liquids stronger than coffee or tea, is quite evident from the large number of vessels such as flagons, tankards, beakers, mugs and cups of various kinds. Many of these fine pieces now repose amid the quiet surroundings of some of our old churches.

shown among the several illustrations of this article. Another Dutch silversmith of renown was Hendrik Bolens, who came to New York about 1680. Both he and his father, Jacob, enjoyed a large share of the silver business in the closing years of the 18th century.

No one interested in art and the development of artistic taste in America can fail to appreciate the work and influence of the silversmiths of the Colonies, their artistic conception and splendid craftsmanship. Their handicraft is the earliest expression we have of our forebears' appreciation of the beautiful in metal. This appreciation became much more general as the nation grew and prospered, developing a steadily increasing patronage, which has encouraged a succession of craftsmen whose endeavors assist in beautifying the homes of America, and today bear silent witness to their artistic tastes and desires.

One of the most comprehensive collections of Colonial

silver of the 17th and 18th centuries is that collected by Judge A. T. Clearwater and for the past several years on public view at the Metropolitan Museum of Art in New York City. With but few exceptions, the pieces are the work of native-born American craftsmen who learned their trade in this country.

The several illustrations will serve to show the reader a few of the finest pieces of Colonial craftsmanship.

PLATE 1. TEA POTS

Fig. 1. Silver tea pot on stand, part of a three-piece tea set made by Paul Revere in 1799. This set is oval in form and decorated with an engraved border. In design this set follows, in simplified form, the English styles of that period.

Fig. 2. Silver tea pot made in 1700 by I. Ten Eyck, a silversmith of Albany, N. Y. This pot with its low squat body, duck neck spout, formed cover, and peculiar hinge, is quite characteristic of the Dutch style in silverware.

Fig. 3. Silver tea urn, made by Paul Revere about 1800. It has a plain vase shaped body, looped handles and a very beautifully engraved border around the body and stand. The square base is supported by four claw and ball feet. This is a typical Colonial piece of exceptionally fine workmanship.

PLATE 2. DRINKING CUPS

Fig. 4. Silver tankard made by Peter Van Dyck, 1684-1750, one of the old Dutch silversmiths of old New York. The flat topped cover has an elaborate serrated front and the thumb piece is a horizontal twist. A cutout border of acanthus leaves and a zigzag wire is applied around the molded base.

Fig. 5. Silver beaker, made by David Jesse, about 1682. Jesse was one of the lesser known Boston silversmiths, but a very good one. The beaker is the earliest form of drinking vessel known and is also one of the few purely domestic drinking vessels to be used in the New England churches.

Fig. 6. Silver flagon made by Peter Oliver 1682-1712. This is one of the earliest Colonial flagons made. It has a tall cylindrical body with moldings encircling the body below the molded lip and above the molded base. It is fitted with a flat top cover with a turned finial or knob, a thumb piece formed by two cupped discs and a very graceful S shaped handle.

Fig. 7. Silver caudle cup, made by John Hull about 1674. It is perhaps the earliest example of this type of cup made in the Colonies. Its body is gourd shaped, the lower part of which is decorated in a chased design, two cast handles and a twisted molding forms the base. Caudle cups are of early English origin and can be traced back to the time of Henry VIII, 1509-1547.

PLATE 2. DRINKING CUPS

Fig. 8. Silver flagon, made by Jesse Churchill, 1773-1819, another celebrated silversmith of Boston. In design this piece shows the influence of the classical revival following the discoveries of Herculaneum and Pompeii. It has the quasi-classical shape with reeded edges and a richly engraved border of leaves and flowers. The handle is square and the cover has a pineapple finial.

The development of the flagon was the same as that of the tankard. It was a very popular vessel in beer drinking countries of northern Europe during the sixteenth, seventeenth and eighteenth centuries.

This will be continued in an early issue.—Ed.

Cleaning Metals Today

Cleaning is a Technical Problem Dealing with Chemical and Physical Processes. It Is a Straightforward Phase of Modern Engineering Methods. Where Modern Technical Knowledge Concerning Solutions, Emulsification and Colloidal Action, is Applied Understandingly the Results are Excellent.

Written for The Metal Industry by R. W. MITCHELL, Department of Chemistry, Massachusetts Institute of Technology, and Member of Board of Directors and Consulting Chemist, Magnus Chemical Company.

Today, in selling most manufactured articles, the "finish" or exterior appearance is an important factor. The exacting demands of the consumer and keen competition among producers, make an attractive or a durable finish essential, if the article is to be a commercial success. Articles which fall in the luxury class depend largely upon attractive finish for their appeal. Articles of utility must have a suitable durable finish to give the article long life, and to assure its retaining value in the eyes of the purchaser. The slogan, "Save the Surface and You Save All," is one of the truest and best messages which has ever appeared on an advertising page. There is another which deserves a place beside it. "Prepare the Surface Well and the Surface Will Endure."

IMPORTANCE OF CLEANING

The many methods employed today for enchancing the value of an article through its surface, such as plating, galvanizing, tinning, japanning, lacquering, painting, rust-proofing, enameling, etc., all have their success directly influenced by the kind of preparation the surface receives before the finishing coat is applied. Proper treatment demands that all foreign matter be completely removed from the surface and from microscopic pores or fissures. Further, the surface should be left in such a physical condition that it can form a satisfactory bond or union with the finishing coat to be applied.

The material to be removed may be surface oxide, scale or tarnish, abrasive particles from grinding or polishing operations, vegetable, animal, or mineral oils or waxes, from the lubricants or "coolant" used in machining or other metal working operations. It may be slushing oils or greases, carbon particles left on steel or iron surfaces after pickling, smut or burnt-on oil left after heat treatment, marking paint, or the nondescript dirt which pieces will pick up in their progress through a manufacturing schedule. Each kind of foreign material to be removed requires different treatment, and that treatment usually varies with the nature of the material from which the dirt is to be removed. Thus the removal of lard oil from a brass surface is a different proposition from the removal of the same oil from an iron or glass surface. When the combinations possible between the different kinds of foreign matter and the different base substances are considered, the choice of the best cleaning method is not always a simple problem to solve. There are certain basic principles to be followed, however, which if intelligently employed will lead to satisfactory results. These will be briefly brought out in the following discussion. I will treat here of cleaning with alkaline agents only, the use of acids, or acid salts for removing oxides, and of mechanical methods of cleaning, such as sand blasting and other abrasion methods fall under a separate classification, and are proper subjects for a separate article.

Time, labor, equipment and detergents are the items entering into cleaning processes. Time and labor are today generally the more expensive, and the equipment and cleaning material which will most quickly accomplish the desired results with the least handling, should always be employed. This is true economy. One other point of importance is reliability and uniformity of results. A process or cleaning material must operate simply, uniformly, and as nearly infallibly as possible, for should occasional pieces of work be imperfectly cleaned, these pieces will, when finished, either be rejected or returned for refinishing. The cost of either alternative is generally great, and the cost of rejected pieces may often be greater than that of installing an improved cleaning system. And in all cases, upon the success of the cleaning operations depends the quality of the ultimate finish of the article. And on this finish depends, to a very great extent, its saleability.

ACTION OF ALKALINE FACTOR

The initial step in a cleaning process is due, in part, to the alkalinity of the detergent. In mildly alkaline solutions, oils, fats and waxes emulsify, that is, they become broken up and dispersed in a very finely divided condition throughout the cleaning solution. Emulsions are formed by lowering the interfacial tension (the inherent tendency of different liquids to maintain their own surface, to stay separate and not mix) between oil and water. The old theory had it that these materials were saponified by the alkali present. Modern investigation has shown this to be absurd, however, for outside of concentrated potash or caustic, none of the alkaline solutions ever used in cleaning are strong enough to saponify an oil or fat. The recent theory developed by Harkins and by Langmuir on the surface structure of liquids and emulsified globules has done much to clarify the little understood phenomena of emulsification. Their papers appearing in the Journal of the American Chemical Society in 1917, are revelations in a new field of thought, which is still being opened up by those interested in industrial cleaning. According to them, emulsification may occur when the surface tension of the water is lowered by the presence of an alkaline material, and when certain forms of matter are present as colloids which can be taken up by the minute oil droplets or globules and held on their surface as a skin or film of almost molecular thinness. This adsorbed skin keeps forming and closing over the globules of oil as they are formed by agitation of the solution, and prevents their re-coalescing. They are thus emulsified. It is seen that three things are necessary—correct degree of alkalinity, the proper colloidal emulsifying agent, and agitation.

The emulsification is but the first part of the cleaning action, however, and removes only oils, grease, or wax. The remainder—particles of dirt and solid foreign matter —must be removed in another way. Plain alkalinity of the solution is of little aid in this important stage of the process; in fact mildly alkaline solutions are better than strong ones. A material must be present in the cleaner which will give a colloidal* solution, one which has a large reacting surface, and which has adsorptive powers for dirt particles which have been loosened up by the removal of greasy or oily material.

* The colloidal condition is a state where the material in question is present in a very fine state of subdivision, dispersed throughout the solution, yet is not in true solution as we ordinarily know it. Some kinds of matter in this state possess very remarkable properties, one of which is to attract to its surface and hold there, other kinds of finely divided matter (dirt for instance).

The colloidal particles in the solution of cleansing agent adsorb the dirt off the surface, hold it on themselves and remove it when the solution is rinsed off. By employing such materials as will readily allow this second cleaning action to take place, the alkalinity of the emulsifying agent may be kept low, and the convenience of working increased. Soap and resinates are our most useful colloids for this work. Certain colloids in solution are so adsorptive in their action that they tend to stick firmly to the surface which is being cleaned, being rinsed off only with many changes of water, and mechanical action. Such substances are said to be poor rinsers. They may remove dirt well, but are then themselves only removed with difficulty.

Alkalinity alone never accomplishes successful cleaning. A common notion is that the stronger (in alkalinity) a cleaning solution is, the better it will clean. This is entirely erroneous. There is probably more poor cleaning done through having the solution too strong, than the reverse. Soap solution of very low alkalinity will clean off mineral oil, where a concentrated caustic soda solution will have no effect. Experience dictates a proper moderation of alkaline strength, in most cases, rather than an endeavor to get the solution as strong as possible.

BASIC PRINCIPLES OF CLEANING

The basic principles to be observed in cleaning are:

1. The foreign matter should be removed by physical means—emulsification in the case of oils, fats or waxes—or by lifting particles of solid dirt off into a colloidal solution. The cleaning solution should be one which has the correct degree of alkalinity for the best results with the particular oil in question, and which contains the most efficient colloidal "lifting agent" for the dirt particles. The first is accomplished by using a correct mixture of salts and alkalies for buffer action; the second is generally attained by a proper choice of soap or similar colloidal material.

2. The cleaning solution should be so made up that the oil and dirt particles are not taken into permanent emulsion, but will separate out again on standing, so that after a few hours of disuse, the oil will separate and rise to the surface of the tank where it may be skimmed off, and the dirt settle out, falling below a false bottom in the tank. Under these conditions a cleaning solution will have a long life. Otherwise the chemicals are used up and cleaning power falls off very quickly.

3. The rinsibility of the solution is important. The persistence of solutions in adhering in thin films to an object, when rinsed with clean water, varies greatly with the nature of the solution. Olein soaps are free rinsing; stearin soaps are not. Phosphates are easily rinsed; silicate solutions on the other hand are completely rinsed off only with great difficulty, and many changes of water. Obviously, even if a cleaner is successful in breaking up and emulsifying dirt off a surface, it is a failure if the solution does not rinse off completely. Also any trace of cleaner retained on the surface or in metal pores, will ultimately lead to blistering, cracking or peeling, as the chemicals slowly act on the under side of the finishing coat.

4. The cleaning solution must have no effect on the material being cleaned. This is particularly important in the case of soft metals, which are sensitive to alkali, due to their amphoteric properties. In these cases the degree of alkalinity must be carefully regulated, and certain inhibiting substances should be present. The action of alkaline solutions on zinc (or zinc alloys) is prevented by the presence of sodium zincate, or where free rinsing is not essential, of sodium silicate. The former material regulates the alkalinity to a point which will not attack zinc, and also cuts down the tendency of zinc to oxidize; the latter forms a layer of insoluble silicate of molecular thickness over the clean surface as fast as it is exposed, protecting it from further action.

Sodium aluminate acts in a similar way with aluminum or its alloys. Copper, and similar metals, may be protected against tarnish due to the combined action of heat and alkalinity, by the presence of small amounts of certain resinates or gums, or of reducing agents.

5. The proper degree of heat should be used to allow the foreign matter to break up most readily. As a rule, increase in temperature makes oily dirt less viscous, and by increasing pedesis (rapid oscillations of suspended colloidal particles) of the colloidal materials present, speeds up its action in lifting off dirt particles. Often, too, heat is valuable in expanding the surface of the object and opening up the pores of the metal. If a brittle or a caked-on material is present, as dried-on polishing compound, or a skin of burt-on oil, the unequal expansion of the metal and dirt layer, on strong heating, will cause the latter to crack and become loosened, allowing the cleaner solution to get in under it and push it off.

Sometimes, however, heating is disadvantageous. Certain animal or vegetable oils, if high in free fatty acids, will emulsify better in cold solution, as they become pasty and sticky through partial saponification with warm alkaline solutions. Some kinds of dirt, and certain lubricants, coagulate and set when heated, in the same way an egg does when boiled. Emulsions, which are readily formed when cold, will sometimes break when heated. The convection currents of rapid boiling are a great aid to cleaning but their effect is primarily mechanical and not thermal.

6. Agitation is another important adjunct to good cleaning, which is helpful in practically every case. The only drawbacks to it are that it cools the solution rather quickly, and in some cases, causes troublesome foaming. Where foaming occurs, however, it can usually be overcome by the addition to the solution of a small amount of kerosene. Agitation may be accomplished in many ways: by mechanical motion imparted to the articles; by pumping the cleaning solution; by convection currents due to boiling; by bubbling compressed air through the solution; by stirring devices; by the gas liberated from an electric cleaner, or by brushing. The means to be employed, again, depend upon the case under consideration. A suitable solution for use in conjunction with mechanical agitation is always worth while, for today, the most important economic consideration is the elimination of hand labor, and the separate handling of individual pieces.

BUFFER ACTION

The understanding of buffer action, and the application of buffer solutions to industrial cleaning problems is a big advance in this field. Buffer action is the inherent characteristic of certain solutes or mixtures of solutes, to resist change in the acidity or alkalinity of a solution. They buffer the solution so as to maintain a constant hydrogen ion concentration (or hydroxylion concentration), or pH value*, regardless of what may be added to the solution. A buffer solution contains a certain amount of reserve alkalinity or acidity, which is called into action only as needed, to counteract changes made by the addition of dirt or foreign material.

The value of the use of buffer solutions for cleaning

* The pH value, or hydrogen exponent, is a numerical measure of the degree of acidity or alkalinity of a solution which is expressed by a range of numbers from 0 through 14. The numbers up to 7 indicate acid solutions; increase in number corresponding to decreasing acid strength. The neutral point is pH = 7. The numbers pH = 7 to pH = 14 indicate increasing degrees of alkalinity. The basis for this system lies in the electrometric method for determining the hydrogenion concentration of solution which is widely used today.

lies in the fact that they offer constant conditions and uniform action throughout their period of use. The bulk of their alkalinity is held in reserve, and is released gradually and progressively as needed, by electrolytic dissociation. The old fashioned potash tank was too strong when first made up, corrosive, dangerous, and cleaned by chemically consuming the dirt. As it was used it gradually grew weaker, and finally "petered out" and ceased to clean. Throughout its short period of use it was constantly changing and hence could not give uniform results. A solution can be made up with buffer salts, however, which will have just the right degree of alkalinity for a certain type of cleaning, and it will automatically maintain this correct point (or pH) for a long period, its reserve alkalinity holding it up to its optimum condition for rapid cleaning. The correct choice and proportions of chemicals to produce a suitable buffer mixture capable of maintaining a certain desired pH is a matter which at present is best left in the hands of a chemist, expert in this line.

ADVANCE OVER OLD METHOD

The successful application of these principles and the understanding and development of methods in metal cleaning are comparatively recent technical developments. It is not many years back that potash, whale oil soap, pumice, and gasoline were called upon to do everything. Some things they did well, but every one of them has objectionable features in use. And there are many jobs they cannot do well, or can accomplish only with an unduly large amount of time or labor. Potash is disagreeable and dangerous to work with, eating the clothes and the skin of the workman, giving off noxious fumes and injuring the surfaces of many metals. On mineral oil it has very little effect, and on vegetable or animal oils it acts too vigorously, turning them into sticky films of partially saponified oil which dissolve off only very slowly. Gasoline has its fire risk, its fumes are disagreeable, and may even be dangerous to a workman in hot weather, and it does not leave a chemically clean surface. Whale oil soap cleans well, where a soap is called for, but its strength is not in proportion to its smell; we have soaps today which are far less odoriferous and clean equally well. Scouring with pumice became practically obsolete when labor costs rose to their present high level, and chemical ingenuity devised cleaners which, with a little mechanical agitation, replaced slow hand scrubbing. Study of the theory of emulsification, surface tension of liquids, adsorption phenomena, reserve alkalinity, surface protection for soft metals and alloys, electrochemical effect of different metals upon each other, when immersed in the same cleaning tank, and other related subjects, has today placed metal cleaning on a true technical basis. Our knowledge is still far from complete, but progress is being made by workers in this field, and there is no doubt that our industrial cleaning is being done better and more economically from year to year.

Chemistry and Jewelry Making

How the Chemist Can Play the Hero in the Drama of the Jewelry Industry—Extracts From an Address Before the American Institute of Chemists, February 5, 1925

By CALM MORRISON HOKE,
Consulting Chemist, Jewelers' Technical Advice Company

Once upon a time a Grecian king gave his goldsmith some gold to make a crown. When the crown was delivered, the king had an intuition that the goldsmith had stolen some of the gold and substituted base metal.

So he called his wise man, Archimedes, and said: "Arky, old top, see if the scoundrel really did cheat me. I don't want to behead my best goldsmith unless I can prove something. Only—don't hurt the crown!"

That was a problem. Archimedes had no touchstone or acids. But one day while in the bath tub, he saw how the water tended to support his weight, and in a flash he discovered specific gravity. And the story tells us that so great was his joy that he dashed down the street, clad only in the aura of inspiration, crying "Eureka!"—"I have found it."

(P. S. The goldsmith lost his head.)

THE CHEMIST'S ROLE IN THE DRAMA.

From that day to this there has been a bond between jewelry and science. Alchemy was the direct result of man's desire for gold. Chemistry is the child of alchemy. Too often the chemist plays the villain's role; as Dr. Slosson says in his lecture on "Ancient Scandals in Science," the early chemists were concerned mainly with fakes; glass instead of real stones; rouge instead of real complexions. Nor have we yet lived down our past. But often enough the chemist plays the hero. And in one role or another he is on the stage or in the wings, all the time.

Both as a science and an art, jewelry making is old. The Egyptians used almost all the basic processes that we use. They could melt, alloy, and solder gold; cut stones, make enamel, etc. In fact the only new basic process is

MISS HOKE IN HER LABORATORY

electroplating. Our other improvements are in details, rather than in principles.

What are these basic processes? Melting and alloying. (The chemist provides crucible materials, fuels, and fluxes.) Removing firecoat. (This means acids, or an electrolytic treatment.) Refining filings and scrap metals; coloring and electroplating. (Here the chemist should be very active.) In addition, there are the occasional deceptions and imitations.

B.P. AND A.P.

The history of jewelry may be divided into two eras: Before Platinum, and After Platinum. There have been more changes in jewelry making in the last twenty-five years than in the previous twenty-five centuries. While this has accompanied the general mechanical and electrical awakening, many of these changes have been directly related to the advent of platinum.

WHY IS PLATINUM POPULAR?

Let us consider why platinum has suddenly become so popular. Some people—even some chemists, who ought to know better—have said that it was popular because it was expensive, and for no other reason. Can that be true?

Chemistry knows about seventy metals. Of these only three—silver, gold, and platinum—have large use in jewelry. Of the others, most of them cost more than silver; probably half are more expensive than gold, many are more expensive than platinum. To mention only a handful, we find, with platinum at $117 an ounce, cerium is $112,* lithium $140, rubidium $252, columbium and erbium $330, beryllium $560, caesium and thorium $650, and radium—well, never mind.

But someone says, "Who wants a lithium ring? It would take fire at a drop of rain. Or a radium one, that would burn your finger!" Of course. My point is that mere price is not a determining factor. Many qualities must combine—beauty, permanence, workability, etc. In fact, we must use the same sort of discrimination that the hunter used when he sang "I shoot the Hippopotamus with bullets made of platinum. For if I used leaden ones his hide would surely flatten 'em."

In this connection we might recall some of the very cheap materials that are popular in jewelry; glass, ivory, shells, silk, tigers' claws, elks' teeth, fish scales, birds' feathers, butterfly wings, and four-leaved clovers. Nor are modern materials barred; witness bakelite and galalith. (The chemist now plays the hero's part.)

"Well then," someone asks, "why didn't they use platinum while it was cheap?"

There are several reasons, but two very potent ones were: (1) They couldn't melt it. (2) They didn't know how to refine the waste metal.

Platinum cannot be melted in the gas-and-air furnace. You must have oxygen. And here, amid cheers, enters the chemist, who obligingly produces cheap commercial oxygen!

With cheap commercial oxygen it became possible for jewelers everywhere to melt their platinum scrap easily; probably this was the greatest single factor in the popularization of platinum. Its desirable physical and chemical properties had long been known to the jeweler.

Nor is this all. If a workman makes both gold and platinum jewelry, his waste will contain both metals. A chemical refining is necessary before this metal can be used again. The spreading knowledge of how to do this is another factor in making platinum popular.

THE CHEMIST INTRODUCES A NEW METAL

About the time that the jeweler had adapted himself to the changes brought about by platinum, behold, the chemist enters again! For some years copper, lead, nickel, etc., have been refined by chemical processes in which the precious metals were recovered as by-products. In refining Canadian nickel, in particular, large amounts of palladium were recovered—a result of chemical research.

A market was created for this palladium. Soon it began to be used as an alloy in platinum. Sometimes openly; sometimes, alas, covertly. The sale of palladio-platinum alloys has been extremely profitable to many people. Even I, as consultant to manufacturing jewelers, have profited, as the new alloys meant various changes in the manufacturing routine. Those who have profited most have been the dealers in the alloys, and (again alas) certain jewelers who have sold them at platinum prices, without mentioning the fact that they were not pure.

THE PLATINUM-PALLADIUM CONTROVERSY

This has produced the famous Platinum-Palladium Controversy. Some dealers have been eloquent in their defense of the alloys, spending much money in propaganda, claiming that they were not only honest, but even praiseworthy. Rivers of ink have flowed, and much hard feeling has resulted.

I shall say only one word in this connection. Though I have benefited financially through the confusion caused by these alloys, I am opposed to their use. I believe they will eventually harm not only the jeweler, but other platinum users, such as the chemists and the dentists, and society in general.

MORE WORK FOR THE CHEMIST

Undoubtedly the chemist has a big role in the drama. There is still a lot for him to do. Let him play hero for a while. Thus, if he wants to benefit everyone, and incidentally reduce the amount of platinum used in jewelry, let him discover a non-tarnishing silver. Let him evolve a really good platinum electroplating solution. Let him make a perfect white gold and white gold solders.

Finally, let him go beyond the ambitions of his grandfather the alchemist. Not gold from mercury, but platinum from lead, should be his "summum bonum."

* Owing to the limited market for these metals, these quotations are approximate only.

Brazing Steel Wires

Q.—One of the articles which we make consists of a number of pieces of high carbon steel wire which pass through the cored hole in a malleable iron casting and are wedged in tightly with a small steel wedge driven in with a hammer. The entire assembly is then brazed, using a fine, round grained brazing spelter with borax as a flux. Of late we have had some trouble because the brazing spelter did not adhere properly to the high carbon wires. We have tried pickling with a weak solution of sulphuric acid, but this does not seem to help the situation. Have you any suggestions to offer us?

A.—Your trouble is probably overheating of the high carbon steel wires. At about 1400° F. carbon steel begins to oxidize. This heat is obtained very quickly in an open flame on such small wires and probably before the malleable iron part becomes red. Try heating in a muffle gas furnace or electric furnace used for heating steel dies. This would keep excess air away and bring all parts equally up to the fusing of the spelter.

Would suggest a lower tempered or finer grained solder; silver solder, or composition with some silver solder mixed with it. Do not use the acid dip because the iron absorbs some of the sulphuric acid and this exudes under the heat treatment. Can the wires be protected by a shield or cover?

If the wires are bright and the borax is applied to keep the air away, the articles will braze.—W. L. ABATE

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Contents

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EDITORIAL

GOVERNMENT TESTS AND PURCHASES

It is a matter of pride to any manufacturer to be able to sell to the Government. Realizing this, the Government allows manufacturers to advertise and circularize the fact that its materials have been found high enough in quality to warrant such purchases. However, a statement of this sort should be analyzed carefully and examined for particulars.

The departments most often mentioned as purchasers are the Bureau of Standards, the Army and the Navy. As is well known the Bureau of Standards was established mainly to set standards for the use of the Government Departments so that they might have a basis of quality upon which to purchase their supplies. Also it conducts researches in the aid of various industries, publishing the results of these researches and making them available to everyone. In no case does the Bureau publish comparative merits of various competitive articles and its recommendations are never to be used to disparage competitors. Statements of fact or certificates may be quoted legitimately, as may also letters, providing their publication is specially permitted.

The Army purchases supplies through its Supplies Service for the various corps, such as Quartermaster, Medical, Engineer, Ordnance, etc. The standards for these corps are now being unified by the Federal Specifications Board and gathered into a set Master Specifications of the United States Government. However, no official endorsement of a specific product is ever issued. In most cases purchases are made as the result of competitive bids, and the only claims permitted for such goods are that they have been "Used by the United States Army" or "Meet the United States Army Requirements." Additional statements must be submitted to the War Department before publication.

The Government has two definite requirements, which must be met by its purchases.

1. Products must comply with the prescribed standards of the department.
2. Purchases are made on a competitive bid basis.

No particular product has the sole right to state that it is the standard for the Government Department. The Government sets its own standards and supplies must meet them.

The National Vigilance Committee of the Associated Advertising Clubs of the World, located at 383 Madison Avenue, New York, in its circular advising upon the methods of properly referring to Government standards in advertising or circular matter, suggests that proposed statements be referred to the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., before publication.

The problem is one which must be handled with extreme care and reputable manufacturers will guard closely against making statements which might be misconstrued. The question is not one of deliberate misrepresentation, but rather of lack of exact knowledge of the strict rules set up by the Government Departments, both for their own protection and for the protection of industry in general.

SALVAGING SCRAP

In an interesting article by R. C. Daniels, Manager of the Salvage and By-Products Department of the Ternstedt Manufacturing Company, of the General Motors Organization, published in Factory for April, 1925, the methods of salvaging scrap are discussed at considerable length. The problem which is present, of course, in every factory, is viewed from the angle of methods of disposal rather than methods of recovery.

The equipment required is of the simplest type, consisting only of a clean floor for sorting, a platform scale for weighing and bins for storage space. In many cases, however, it may be necessary to add a magnetic separator to remove iron and steel from the other metals.

Once the sorting has been accomplished the question is only of the avenue of disposal to use. These avenues are listed as follows:

1. The copper and brass rolling mill.
2. The large smelter and refiner.
3. The local brass foundry.
4. The broker.
5. The local dealer who operates a warehouse.
6. The junkman.

The functions of these various agencies are quite distinct. A rolling mill will probably pay the highest price, but will take only certain classes of scrap, preferably its own, this of course depending upon the type of product of the particular rolling mill. The large smelter also demands carload lots but will take anything whether it is sorted or not. However, clean, classified materials command a much better price. A local brass founder will often accept certain selected grades of material, and it will sometimes pay to sell directly to him in small lots. The price obtainable depends entirely upon the market price of ingots.

The broker will buy anything at any time. He has always enough connections to be able to dispose of his material. Of course, his profit will come out of the seller's pocket, but he is often a great enough convenience to make him worth while. The local dealer is the small lot man, the logical agent to handle materials running a few hundred pounds or perhaps a few tons. He stores these materials, after doing the necessary sorting, and sells to the smelter in carload lots. The junk dealer is very seldom the proper agency for a manufacturing plant, but is rather a collector of a few pounds here and there, which he sells to the dealer.

Prices obtainable range from 70 per cent of the copper in the scrap in clean clippings down to 12 per cent for brass grindings. It is seldom possible for the seller to do anything but accept the price set by his local channels of distribution, since these prices are dictated by market conditions. However, if he is a large shipper he can get competitive bids from smelters and perhaps mills.

The primary considerations in the disposal of scrap are the accuracy and cleanliness with which it is sorted and classified. Clean metal will always command enough of a premium to pay for sorting it, if the quantities are sufficient. The best method is to sort and classify at the actual sources of the scrap, as far as possible preventing contamination.

THE METAL INDUSTRY has published in the past a large number of articles on reclamation methods from the point of view of the refiner and melter. The secondary metal trades have evolved a technique, both metallurgical and mechanical, which we have done our best to improve. The problems are numerous and often very difficult. It is safe to say, moreover, that in the vast majority of cases they are caused by impurities—in other words, faulty classification at the source of the scrap.

Care exercised at this source will result in higher prices for the scrap, higher recoveries by the smelter, less waste of materials and better feeling all around.

IMPROVING ALUMINUM ALLOY CASTINGS

In this issue is an abstract of a paper by S. L. Archbutt, read at the meeting of the Institute of Metals in London, March 11, 1925, describing attempts to eliminate dissolved gas in aluminum castings, thus reducing pinholing. The process suggested consists of allowing the molten metal to cool slowly in the crucible and in the furnace until it has just completely solidified. It is then remelted, stirred, carefully raised to the pouring temperature and cast. Ingoting the metal is not satisfactory, as the ingots cool too quickly, and during re-melting, are too much exposed to the furnace gas.

In a later experiment described, the passage of an inert gas (nitrogen) through the melt during slow cooling and solidification was found still further to improve the soundness of the resulting sand cast bars.

The discussion of this paper of course, turned chiefly on the practicability of the suggested method. Dr. Seligman believed that freedom from pin-holes in sand castings was practically impossible of achievement; he recommended casting in metal molds. There was some question also about the need for actual solidification in the furnace, it being probable that most of the gases were liberated prior to solidification. It was answered that actual solidification was necessary to drive off the residual gas which was not given off during cooling.

The slow cooling to solidification was pointed out as the great stumbling block to practical application. Melting in a vacuum was suggested; the danger of re-absorption of gas upon re-melting was pointed out. Repeated re-meltings might very easily be harmful. Dr. Rosenhain expressed his firm belief that the method recommended was practical. In re-melting it was necessary to protect the metal from the attack of the gases which had been liberated and sound melting practice should be observed. If, however, it was not possible, due to foundry conditions to leave the metal in the furnace to cool, he suggested ingoting, not in the form of notch bars, but in sand molds shaped like the crucible in which re-melting was to be done. This would expose a minimum of surface to air and furnace gases, and the re-melting would be comparatively harmless.

He regarded melting in a vacuum both unsound and impractical and suggested a wider application of this method, namely to other metals. He pointed out, however, that each would have to be studied individually. The main principle of this method, namely that it was the act of crystallization which expelled the gases finally, was the important point. The practical application of this principle was the achievement of the author of the paper.

How completely practical this method is can be proved only by trying it out in a working foundry. Obviously it will slow down production. But just how much, what it will cost, how much it will save in rejects and so on can only be determined by trying it out for a fair length of time.

For the foundry having much trouble with aluminum castings, such a test might be worth while.

THE AMORPHOUS METAL THEORY

In a paper read before the New York meeting of the Institute of Metals Division, in February, 1925, R. J. Anderson concluded, on the basis of the evidence of the X-ray patterns obtained from cold worked and heavily polished surfaces of metals, that metals are broken up into very fine crystals and not turned into amorphous or non-crystalline material. The discussion of this paper (reported in our March issue) centered on the fact that while Mr. Anderson's work had been carefully done, there was no definite proof of the absence of amorphous material. The only thing clearly shown was that fine crystals did exist. Dr. Benedicks and others pointed out the difficulty of disproving the existence of any material as hard to define and limit as the amorphous phase, and the general opinion seemed to be that neither side of the question was weakened in its beliefs.

In an article in The Metallurgist for January 30, 1925, Dr. Rosenhain discusses the present position of the amorphous theory, particularly with reference to the insight gained by X-ray analysis. He states that even though "the most severely cold worked metals still give X-ray reflections which indicate the presence of a large amount of crystalline metal. . . . Beilby repeatedly emphasized his view that no amount of cold working can ever convert more than a fraction of a ductile metal into the amorphous state, since at an early stage of the process the metal would become, at least locally, so much hardened that further plastic deformation accompanied by formation of additional amorphous metal would be inhibited. The X-ray evidence, therefore, does nothing more than confirm the view of Beilby in this respect, for it does not by any means prove the absence of a certain proportion of amorphous material surrounding the crystalline particles which still remain."

Dr. Rosenhain gives as additional evidence the fact that the orientation of crystals in a single direction during the process of cold working could hardly take place if the metal remained entirely crystalline throughout the process. Moreover, the fact that X-ray reflections from polished, cut or burnished surfaces are as a rule decidedly less sharp than when the surface layers have been removed (by etching for example), is additional indication of the existence of an amorphous phase.

The whole question is, of course, highly theoretical and at times borders on the philosophic. Nevertheless, it is of utmost basic importance to the science, and for that matter the art, of metallurgy. Research workers operating on different bases are likely to obtain different results. These results will eventually be translated into industrial uses. For that reason, even though the amorphous theory seems far from the brass foundryman or metal worker, its final disposition may make surprising changes in the type and quality of sheet brass or condenser tubing. Intelligent men engaged in working with metals will watch these discussions closely.

GOVERNMENT PUBLICATIONS

Hospital Beds. Simplified Practice Recommendation No. 24, issued by the Bureau of Standards, Washington, D. C. Price 5c.

Steel Barrels and Drums. Simplified Practice Recommendation No. 20, issued by the Bureau of Standards, Washington, D. C. Price 5c.

Builders' Hardware. Simplified Practice Recommendation No. 18. Issued by the Bureau of Standards, Washington, D. C. Price 10c.

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE

ALLOY FOR SAFE KNOBS

Q.—As a reader of your valuable paper I would like to ask you for a monel mixture containing copper, nickel, zinc, and iron. The purpose of this particular mixture is for a dial and knob on a safe. It should be hard and white in color.

A.—The mixture we would suggest, one that should fill your requirements, is as follows:

26 Monel metal
52 copper
20 zinc
1 iron
.50 ferro-manganese
.50 aluminum

Melt your Monel and copper and iron and manganese at the same time. Charge the ferro-manganese and iron first, then the Monel and copper. When melted add the zinc a little at a time. Make mold similar to molding for manganese bronze.—W. J. R., Problem 3,339.

BRIGHT TIN ON PENS

Q.—What method is used in getting a brighter finish on tinned steel pen points?

A.—For the bright finish upon steel pens after tinning, ball burnishing in an oscillating type of burnishing barrel, such as used by jewelers, is most effective.

The balls should not be over 1/32 inch in diameter. What is termed a tubbing barrel is the ideal barrel. They revolve continuously in a soap solution prepared from olive oil soap chips which gives the continuous lubrication necessary.

It is also possible to produce a bright lustre upon the pens by tumbling in macerated leather and maple wood sawdust, the tumbling medium, being precipitated carbonate of lime, used either dry or mixed with benzine or gasoline.

Tin is very soft, and readily polishes. Possibly wheat bran and a little lime as outlined will give the results desired.—C. H. P., Problem 3,340.

CRYSTALLIZED TIN PLATE

Q.—We are enclosing herewith samples of Crystal Tin, which we are desirous of manufacturing. We would like to know what information, if any, you may have regarding this material and the method of manufacture.

A.—Crystallized tin plate surfaces can be produced as follows:

1. The tin surface must be clean and as bright as possible; in other words, the tin plate must be new and free from oxidation.

2. The tin sheets should be heated to 212° F., and then the following solution should be rubbed over the surface by the aid of a sponge or swab made of flannel.

3. The crystallizing solution should be prepared from the following materials and mixed in the order given:

Water	fluid measure 170 ozs.
Sulphuric acid 66°	20 ozs.
Nitric acid 38°	2 ozs.

The solution should be thoroughly mixed and heated to 200° F.

4. Avoid an excess of the acid mixture when applying to the tin plate sheets, or the sheets will darken excessively. Apply as quickly as possible and rub lightly as soon as the crystals develop, and the entire tin sheet has been gone over, then wash them in cold and boiling water and dry out in fine sawdust.

The sheets are now ready for lacquering with a tin varnish lacquer. This type of lacquer can be colored with aniline dyes so it is possible to produce a number of shades of colors. These must be transparent to show the crystalline structure.

5. The black crystal tin like sample submitted, is lithographed with black printer's ink; the printing is so arranged that the gray surface of the tin and the crystals are shown through the black. When the surface so printed is thoroughly dry, then a thin coating of transparent tin lacquer should be applied which will give lustre to the black surface as well as the exposed tin and crystals.—C. H. P., Problem 3,341.

CORE WASH

Q.—We are having any amount of difficulty with cores in castings with heavy sections of metal caused by burning of the cores by the surrounding hot metal. We have used silica sand watch on our cores without any improvement. If you know of a core mixture that will prevent this trouble we would appreciate hearing from you.

In pouring pressure castings we find it is necessary to pour metal very hot and it is important that we have a core that will withstand the higher temperature necessary in pouring these castings. These cores vary in diameter from ½" to 2" in diameter.

A.—If you will take gasoline and black lead and make a paste like dough and rub the core well with the mixture, it will give you a good clean core and leave the casting very nice and clean.—W. J. R., Problem 3,342.

FRENCH BRONZE

Q.—Kindly send, if possible, a formula for a French bronze finish for medals.

A.—The following formula should produce an excellent French bronze finish on medals.

It may be necessary to lightly copper-plate the medals to produce the most efficient results.

Solution: Water, 1 gallon. Copper sulphate, 1¼ to 2 ozs. Potassium chlorate, 1¼ to 2 ozs. Temp. 200° F.

Immerse the articles in the heated solution for a short time, then remove, wash and dry carefully.

Scratch brush with a soft crimped wire scratch brush; then finally wax with beeswax.

A soft bristle hand-brush may be used for waxing. It may be necessary to repeat the coloring operation to produce the desired tone.

Waxing should only be applied when the desired finish is produced. Nickel sulphate used in the copper sulphate also gives interesting bronze tones. Use 4 parts of the former or 4 ozs. to 1 or 2 parts or oz. of the nickel salt.—C. H. P., Problem 3,343.

LOW EXPANSION BRONZE

Q.—I will greatly appreciate any information regarding treatment and seasoning of bronze castings to better prepare them for close, accurate work and to obtain the least possible coefficient of expansion. I understand there are methods to accomplish this, but I have not so far found anyone that is very effective.

A.—We do not know of any method of treating bronze castings to alter their coefficient of expansion.

The expansion of alloys by heat has been examined by Messrs. Calvert and Lowe, with a view to learn whether their expansion followed the laws of proportions of their components. Four series of alloys were examined, namely, zinc-tin, lead-antimony, zinc-copper, and copper-tin. In each case the expansion was less than that deduced by calculations from their equivalents.

In alloys of copper with tin, it was found that only a small quantity of tin entered into the composition of a bar. The expansion fell considerably below pure copper, although the tin added had a much higher rate of expansion than copper. From their experiments they concluded that a very small proportion of impurity has a marked influence upon expansion. Also, the molecular condition of a metal was observed to have an important influence on the rate of expansion. The same no doubt will be found true in the case of alloys.

Matthessen states that the expansion of metal due to heat takes part in that of their alloys approximately in the ratio of their relative volumes. He gives a table of the expansion of several alloys, which confirm his statement.—W. J. R., Problem 3,344.

FROSTED BRASS

Q.—Will you please send us, as soon as possible, a formula for producing on aluminum a matted or frosted finish.

We are enclosing a brass nameplate and would advise that the frosted finish which we want to get in aluminum is similar to the background of this brass nameplate.

A.—The frosted finish on your sample brass nameplate can readily be produced by the etching acids and the final bright acid dips.

Not so with aluminum, however. Acids such as nitric acid, 3 parts; sulphuric acid, 1 part, will produce a dead white finish frequently termed a matt finish. To produce even this finish, the aluminum must first be immersed in a hot caustic soda solution. Water, 1 gallon; caustic soda, 4 to 8 ozs. It is our opinion that you can only produce a similar frosted finish by mechanical methods, such as sand blasting with very fine steel shot or ground glass. Or by the aid of a steel satin finishing scratch brush.—C. H. P., Problem 3,345.

MOLD FOR COMPOSITION CASTING

Q.—We are sending you under separate cover for your examination a stop body casting which shows foreign matter on one side which we assume is the cope side of the casting, and would like to inquire what you believe is the cause of same. During the polishing operations this element cannot be seen, but as soon as the buffer attempts to buff the castng this element seems to be so hard that the buff will cut the brass metal adjacent to it, and leave it projecting above the surface of the casting.

This casting is made of 88 copper, 3 tin, 4 zinc, and 5 lead, with about an ounce and one-half of phosphor copper added after drawing and skimming of the pot. The metal is melted in number 80 crucibles (new style) in oil furnaces, about fifty minutes being required per heat. After the metal has run down a charge of broken glass is placed on the top of the metal while bringing it up to heat. After the pot is drawn the glass is skimmed off and about half a tea-cup of borax is used as a scavenger, which is also skimmed off and a small block of wood used to produce a deoxidizing flame during the pouring process.

We are using all virgin metals of the best grade for our work, having only the one mixture in our plant. We, of course, re-run our own gates and have been in the habit of adding about thirty pounds of our own machine borings. These are all passed through a magnetic separator, and to replace the loss of zinc in them we also add a small quantity of yellow brass turnings which is also our own scrap from the screw machines.

As we have a long noon hour in our foundry we have taken advantage of this time to utilize it in melting down some pots composed entirely of red brass borings which must be added from time to time to the crucibles as the melting proceeds.

We are using genuine Albany sand and have watched very closely as to the tempering and riddling as well as the spraying and dusting of the molds. The cores used are also of a very good grade of bank sand with some Korde and linseed oil as binders. As the two flat surfaces on the inside of the casting must be perfectly flat and free of burrs these surfaces of the cores are smoothed over with graphic paste by hand.

In regard to our fuel oil, from the analyses recently made we find that we have slightly over one per cent of sulphur content.

A.—On examination of the sample casting we are of the opinion the trouble is due to fine sand, and where this sand comes from is for you to determine. If you put it under a glass you will see the sand very clearly. However, it may come from the core or the dusting, as very often the dusting is done with flour and ashes. It may also come from the gate; if the sand is too fine it scabs and washes.

We suggest you used only flour for dusting, and to your molding sand, if you find it washes, add about 10% open sand. It is rather difficult for us to say just where the trouble is coming from, but we can say the sample we have contains a fine sand on the surface.—W. J. R., Problem 3,346.

NOBBY GOLD

Q.—How can I get what is known as a "Nobby" gold finish?

A.—"Nobby" means smart looking or in terms of plating parlance a good lustre finish. Platers' Wrinkles gives an excellent formula for gold plating; the solutions thus prescribed are used all over the United States.

But to obtain the maximum of a lustre gold finish, the basic metal itself must be polished to a very high lustre by careful buffing and the cleansing must be just as thorough to avoid any stains which would show through the gold deposit. The voltage and temperature of gold solution are important. Voltage, 2½ to 3. Temperature, 140 to 160. Anodes of fine gold or as an alternative, sheet carbon or hard rolled nickel sheets can be used.

If the gold surface is to be repolished after plating, then small canton flannel buffs should be used, not over 4 in. in diameter.

The polishing medium should be jewelers' rouge (gold) mixed with alcohol.—C. H. P., Problem 3,347.

SMOOTH ALUMINUM CASTINGS

Q.—Can you give us any information with reference to making aluminum castings smooth. We seem to have considerable trouble in getting our castings as smooth as we should, they seem to be very rough on the outside. We are sending you sample of our work enclosed.

A.—The way to get smooth aluminum castings is to use Windsor Lock sand. Fine sand gives smooth aluminum castings. Any of the foundry supply houses can supply you with it. The sand is used as dry as consistent with clean molds.—W. J. R., Problem 3,348.

SPOTTED NICKEL PLATE

Q.—We have some malleable iron castings that spot out several months after heavy nickel plating; that is, dull spots appear underneath the surface of the plating on some parts of the castings and mostly around very fine holes that plate over and thus spot out.

The castings are not pickled before polishing or plating. However, it seems that the cleaner, dip or nickel solution gets into the minute pores, and works to the surface after several months.

Trying to find the cause we copper-plated some, and they plated every place except around the fine holes, where it would not take. Upon taking the piece out of the copper solution fine bubbles appeared on the spots in question.

This condition does not exist with grey iron, steel drop forgings, or brass that is nickel plated; only on malleable iron.

A.—We have made a careful study of the small sections of nickel plated and polished malleable iron castings submitted to us for solution of the problem of spots that develop after some time.

Our conclusions are the spots and pitting are due to hydrogen occlusion during the plating operations. It is possible that some of the nickel solution gets in the porous spots of the castings. To overcome the difficulty make additions of hydrogen peroxide to your nickel solutions at intervals of a day or two; start with 1/16 oz. per gallon which may be increased up to ½ oz. per gallon of solution without injury.

The oxygen released from the hydrogen peroxide solution under electrolysis combines with the hydrogen and forms water—thus the pitting action is neutralized.

Try the method out; if effective we shall be glad to furnish you a method of preparing the hydrogen peroxide from sodium perborate. Boric acid was first advocated by Weston. It is a weak organic acid as we all know because it is universally used as an eye wash. Weston claimed that it produced a more malleable and ductile nickel deposit. This is no doubt true because it is to a more or less extent a hydrogen controlling factor. It is possible, under the influence of electrolysis, that an oxygen factor is produced.

Boracic acid then can be used in fairly large amounts—4 to 5 ozs. per gallon of nickel solution—without detriment and to an advantage in producing a softer, more malleable nickel deposit. C. H. P., Problem 3,349.

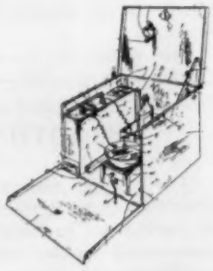
PATENTS

A REVIEW OF CURRENT PATENTS OF INTEREST

1,525,456. February 10, 1925. **Method of Rolling Zinc Slabs.** Oliver P. Luetscher, Pittsburgh, and Florence C. Biggert, Jr., Crafton, Pa.

In the method of rolling zinc slabs into thin gauge sheets, the steps consisting in forming a slab having a weight too great to be effectively handled manually, reducing the same in a three high mill, trimming the edges of the rough sheet, and then reducing the rough sheet to the desired thickness by passing the same successively through a series of finishing mills.

1,526,062. February 10, 1925. **Electroplating-Outfit Case.** John O. Golden, Portland, Ore.



In an apparatus of the character described, a case, a closet comprising a floor, one side wall and a wall at the front end of the closet, the other side of the closet being open for access to the interior thereof, said closet being removably secured to one side wall of the case, such side wall constituting a closure for the open side of the closet.

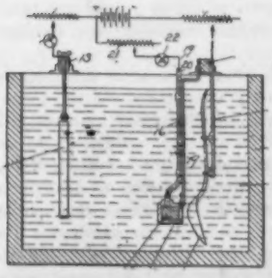
1,525,127. February 10, 1925. **Coating Aluminum Articles.** Fulton B. Flick, New Kensington, Pa., assignor to Aluminum Company of America, Pittsburgh, Pa.

The process of forming a coating of oxide on an aluminum article, which comprises employing the article as anode in the electrolysis of an aqueous solution containing ammonia.

1,526,400. February 17, 1925. **Process of Recovering Metal From Scrap.** Sigmund Waldmann, Dortmund, Germany, assignor to the Firm of Deutsch-Luxemburgische Bergwerks- und Hütten-Aktiengesellschaft, Bochum, Germany.

Process of recovering metal from scrap resulting from working metals on turning-lathes or planing machines consisting in heating the scrap up to glowing heat, subjecting it while heated to pressure and melting the briquettes so obtained.

1,526,644. February 17, 1925. **Process of Electroplating and Apparatus Therefor.** George H. Pinney, South Manchester, Conn., assignor to The Williams Brothers Manufacturing Company, Glastonbury, Conn., a Corporation of Connecticut.



An electroplating apparatus comprising a support for an article to be plated, a primary anode, a secondary anode located in active relation to said article, a connection between each of said anodes and a source of electric energy, and a connection between said article and a source of electric energy.

1,526,851. February 17, 1925. **Melting Furnace.** Lees Hall, Baltimore, Md., assignor to Alfred W. Channing, Inc., New York, N. Y., a corporation of New York.

In a furnace for melting metal, a main body portion forming a combustion chamber, and provided with an offset upper end defining a flange, an apertured, internally flanged intermediate body seated on said flange and provided with said offset upper end, a chamber, a melting pot supported by the flange of said intermediate body and depending into said main body portion, a cover for said main body portion, a plurality of sets of mixing elements within the melting pot, and means for rotating said mixing elements.

1,526,899. February 17, 1925. **Metal-Coating Machine.** Harry W. Bundy, Detroit, Mich.

In a machine for the purpose specified, the combination of means for moving a piece of stock through the machine at a relatively high speed, means for removing the oil from the stock while so traveling by combustion and means for subsequently applying the metal coating to the stock.

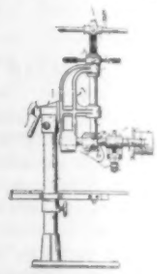
1,527,095. February 17, 1925. **Method and Apparatus for Coating.** Lawrence C. Turnock, Edgewood, Pa.

In the method of electroplating, the steps consisting of submerging a plurality of articles to be coated as cathodes in a bath in co-operative relation to a source of coating metal, and separately indicating the deposit on each article.

1,527,305. February 24, 1925. **Electrodeposition of Metals.** Thomas William Stainer Hutchins, Davenham, England.

In an apparatus for the electrodeposition of metals, a vessel containing an electrolyte, a cathode and an anode arranged in said vessel, means for circulating the electrolyte, and filtering means arranged immediately adjacent the cathode and isolating the latter from the anode, the filtering means being adapted to completely free the electrolyte around the cathode from all foreign solid impurities of a nature which would become a couple with the metal being deposited.

1,527,361. February 24, 1925. **Babbitting Device.** Ernest W. Jones and Horatio W. Smith, San Jose, Calif.



Positioning means for a rod of the character described, comprising a clamp for holding the rod, a seat for the clamp allowing of universal motion of the latter relative to the former, and means for holding the clamp to its seat adapted to be tightened when the clamp has been positioned.

1,528,144. March 3, 1925. **Process for Cleaning and Recovering Soldered Joints.** Jean Couesnon, Paris, France.

An electrolytic process for cleaning alloys having soldered portions, by means of an electrolyte containing a salt the anion of which is capable of attacking the metals composing the solder without attacking the metals of the alloy.

1,528,394-1,528,396. March 3, 1925. **Antimony-Sulphuret Mixture and Process of Making Same.** Fred K. Bezzenberger, East Cleveland, Ohio, assignor to Ray S. Gehr, trustee, Cleveland, Ohio.

A vulcanizing agent comprising in combination an intimate mixture of antimony pentasulphide, precipitated free sulphur, and a mechanical filler characterized by freedom from iron, from alkalinity and from change of physical state under vulcanizing conditions.

HOOVER RUNS PATENT OFFICE

On March 19, 1925, President Coolidge issued an executive order transferring the United States Patent Office from the jurisdiction of the Department of the Interior to the Department of Commerce, thereby placing it under the control of Secretary Hoover.

In announcing the change, Secretary Hoover declared that he intended to undertake a vigorous campaign for the removal of present disadvantages and difficulties of American patentees and American manufacturers.—NEW YORK TIMES.

PATENT LITIGATION

The Ford Motor Company of Detroit, Mich., must pay damages, yet to be determined, to the Parker Rust Proof Company for infringement of a patent on a rust-proofing process, Judge Tuttle ruled March 28, 1925, in the United States District Court.

The patent at issue was granted to Thomas Coslett of Great Britain in 1907 for seventeen years and was to protect a process of rust-proofing iron and steel by the use of a solution of phosphoric acid and a controlling agent formed by action of the acid on iron filings.—NEW YORK TIMES.

EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

Progress of Automatic Polishing Machines

Written for The Metal Industry by JOHN O. CAMPBELL, The Robinson Automatic Machine Company, Detroit, Mich.

Twenty years ago such a thing as the automatic polishing of metal surfaces was an unheard of thing, and like most new developments, considerable doubt was shown by possible users as to the possibilities of automatic polishing machines. Gradually, however, practical experience removed these doubts and the business rapidly increased.

The manufacturers of stoves and ranges perhaps deserve the credit of first seeing the possibilities of automatic polishing machines, and one after another they adopted them, until today there is hardly a stove and range manufacturer in this country or Canada of any considerable production, but is using one or more machines, some having four and five in continuous operation.

Manufacturers of sad and electric irons, manufacturers of safes and vaults, manufacturers of builder's hardware, and latterly, manufacturers of automobile bumpers were next to appreciate the immense saving in cost and the improvement in finish of their work and the uniformity of it, when polished automatically.

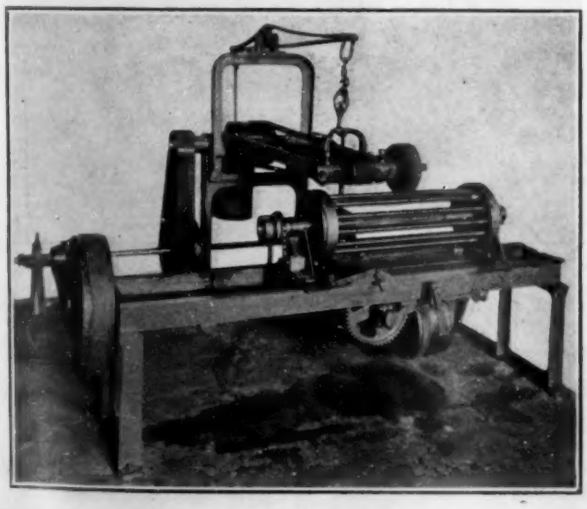
From the present outlook it is safe to say that all manufacturers in these lines either now are or will use one or more such machines if they have sufficient production. There are also manufacturers in other miscellaneous lines who polish flat and oval metal surfaces in quantity, who find these machines valuable.

The polishing and buffing of brass and iron tubing, automatically, is a newer development, but it is making rapid strides; automobile accessories manufacturers, plumbers' supply manufacturers, gas stove manufacturers and others being interested.

Below are descriptions of machines made by the Robinson Automatic Machine Company, of Detroit, Mich., illustrating some of the advances made in this type of equipment.

AUTOMATIC POLISHING OF TUBING

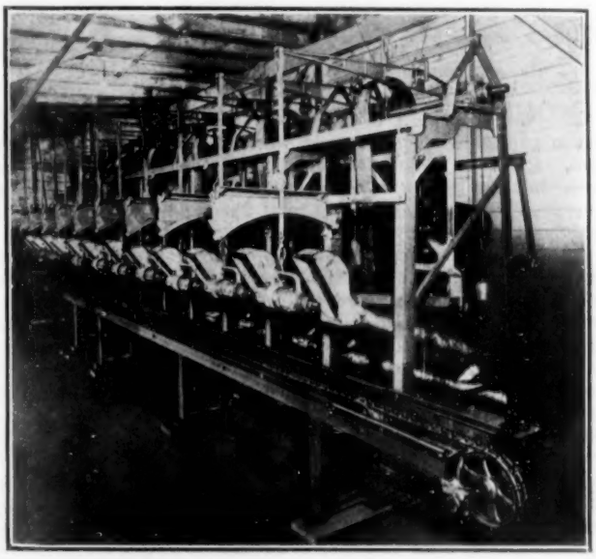
Robinson automatic polishing machine for polishing and buffing iron and brass tubing is a single wheel machine,



POLISHING TUBING

designed to polish and buff brass and iron tubing from ½" upwards and up to 42" in length. The tubes, 12 in number, are placed in the chuck or holder. This holder automatically passes under the polishing wheel and automatically returns to the starting point. When it reaches the starting point it automatically trips and brings the next pipe under the wheel, and so on indefinitely.

Tubes are put in and taken out without interfering with the continuous operation of the machine. Same polishing wheels



POLISHING MACHINE FOR FLAT AND OVAL SURFACES

are used as when polishing by hand. Tripping device may be disengaged if and when desired. The thread on threaded pipe is not touched by the wheel. Double clutch is provided to give two speeds, one for polishing and a higher speed for buffing. Tubing revolves in the holder at the proper speed as they pass under the polishing wheel.

The machine is said to be simple, durable, fool proof and moderately priced.

AUTOMATIC POLISHING OF FLAT AND OVAL SURFACES

The Robinson automatic polishing machine for polishing stove plate, furnace registers, sad and electric irons and other flat and oval surfaces is built with twelve spindles, though it can be furnished with any number of spindles, from four to twelve. This machine has a stroke of polishing wheels of 42", which can be cut down to 29" if desired.

The dimensions of the twelve spindle machine are as follows: 36 feet long, 9 feet high and 8 feet wide. It has rack and gear drive, which insures a uniform pass over every part of the work to be polished and does not grind more on any one part of the work than another.

It is claimed that stove manufacturers report polishing from 75 to 110 stove tops per nine hours on one of these machines; furnace manufacturers report polishing from 125 to 150 register faces in nine hours; sad and electric iron manufactures report polishing from 2,800 to 3,200 irons per day and doing it better and more uniformly than it can be done by hand.

This machine weighs about nine tons and is fully equipped with the best grade of roller and ball bearings.

AUTOMATIC POLISHING OF BUMPER BARS

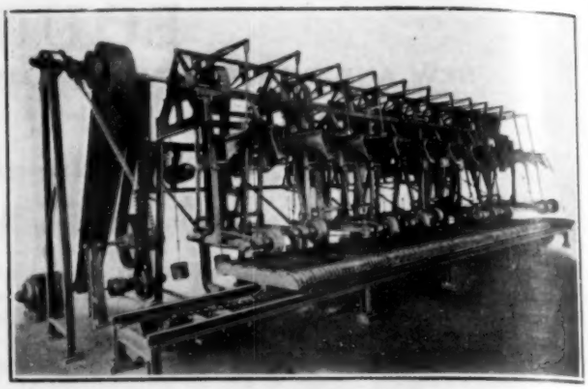
The standard machine is built with twelve spindles, though it can be furnished with any number of spindles from six to twelve. It is a well-built, sturdy machine, the twelve spindle

machine, weighing about twelve tons and requiring a space for operation of 36 feet long, 10 feet wide and 12 feet high. It has a polishing stroke of 64", and will polish material up to that length.

Bumper bars are placed on follow boards, as shown in the illustration, from 25 to 30 on a board, depending on their size. These follow boards are placed on carriages and travel at right angles to the wheels. Seven of these follow boards holding from 175 to 200 bars are always under the wheels.

When each board passes under the last wheel, the operator takes off the finished bars, brings the follow boards and carriages back to the starting point and refills with rough bars which go through the same operation.

This machine has a feed travel of eight inches per minute, and the production is from 1,600 to 2,000 bumper bars per nine-hour day. It is also used by bumpper manufacturers to buff the bars as well as to polish them. It is stated that the estimated saving in cost of polishing is about 60 per cent.



POLISHING BUMPERS

NEW GUN FOR FURNACE REPAIRS

Relining, patching or surfacing furnace walls with great speed and at low cost, is the abject of the Quigley refractory gun. Refractory materials of plastic consistency, to conform with the best known refractory practice of today in the maintenance of boiler and furnace walls, are applied with this gun, which is operated by compressed air.

Advantages claimed for this gun are that it will apply premixed materials at a surprisingly low cost, doing in minutes what in the past has taken hours to do by older methods; it enables quick repairs or hot patching of furnace walls or baffles in places not easily reached by hand patching methods.

Pre-mixed refractory material is placed in the gun. The nozzle is then pointed at the place to be repaired, and the gun operator, by handling the valve controls, forces the mixture from the gun through a section of hose to the nozzle where the repair man makes the application.

Pressure required will vary from 90 to 100 lbs., depending on the nature of the material. For heavy plastic mixtures, pressure from 95 to 100 lbs. is used, and for thin mixtures work has been done at pressure as low as 50 lbs.

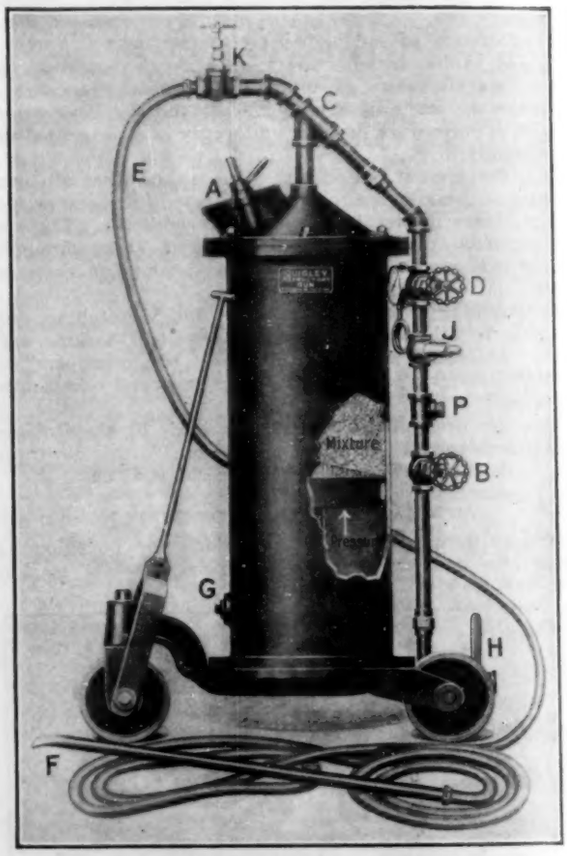
As the illustration shows, the gun consists of a cast iron cylinder from which the material is forced by pressure applied to the piston. Pre-mixed plastic material is placed in the gun through a charging opening (A) in the top.

Pressure is applied at the bottom of a piston, through pipe connection P, and controlled by valve B. As the piston rises, the mixture is forced into the Y connection C from which point it is carried through the hose to the nozzle by the combined pressure of the piston and pressure through the air control valve D.

A drain plug G is provided just above the piston and a quick opening cock for releasing the pressure under the piston at H. When the gun is emptied the cock H is opened, and the piston returns to its former position. The gun is then ready for refilling. It has pressure gauge and pop safety valve at J.

The gun has a capacity of 2 cubic feet of mixed material. It is mounted on 3 wheels, and can be easily moved from place to place around the plant.

The Quigley gun, when not required for furnace repair work, can be used about the plant for rough white-washing, spraying paint or handling plastic mixtures such as stucco.



SPRAY GUN FOR REFRACTORIES

It is manufactured by Quigley Furnace Specialties Company, 26 Cortlandt street, New York.

TESTING EQUIPMENT FOR NICKEL SOLUTIONS

WRITTEN FOR THE METAL INDUSTRY BY E. A. HALL, ELECTRO-CHEMICAL LABORATORIES, MONTCLAIR, N. J.

For a long time there has been a general move on the part of the manufacturer as well as the practical plater to find some other means and methods than those now employed for the control and analysis of nickel plating baths. The present methods have been in use for years, and have not kept pace with other improvements in the plating industry. This has been due, no doubt, to the lack of some other means simple enough for the non-technical man to use. At the present time a number of firms as well as practical platers have eliminated from their every day efforts the old hit-and-miss methods governing the control and analysis of nickel baths, thereby bringing about a standardized conditions. But it has been necessary for them to have employed either a chemist or a plater who has studied chemistry. It is the object of this firm to make it possible for anyone to get the same results by a simple and positive method.

For years the control of nickel plating baths by the average operator has been attempted entirely by the use of litmus paper, congo paper and the hydrometer. As will be explained in very

simple manner the use of these is of little value, and in a number of cases it has been found that harm has been done rather than good by their use.

In the first place, litmus and congo papers when placed into a nickel solution give only a relative finding as to color produced, whether the bath is more acid or alkali than has been found satisfactory by past experience in the plant. Secondly, it is difficult to secure test papers of uniform colors or to compare these colors accurately.

What is true of test papers is also true of a hydrometer. The fact that a hydrometer will show a certain reading in degrees "Baume" simply means that the solution being tested is so much heavier or denser than water, but in no way gives any true idea of the actual amount of metal that the nickel bath contains. To a large extent good nickel plating depends on the proper amount of metal in solution and the determination of acidity in order to standardize plated products these must be determined and controlled, accurately.

Within the past few months there has been placed into the hands of manufacturers and platers, a very complete but simple testing outfit, including information, data, and means for correcting and maintaining an absolutely standardized condition covering nickel baths. Under this control which has been adopted by a large number of firms it is now possible to get complete and accurate determination of the degree of acidity, or the ounces of metal that any nickel bath contains, thereby making it possible to set certain standards to govern the different classes of work, and maintain them at all times.

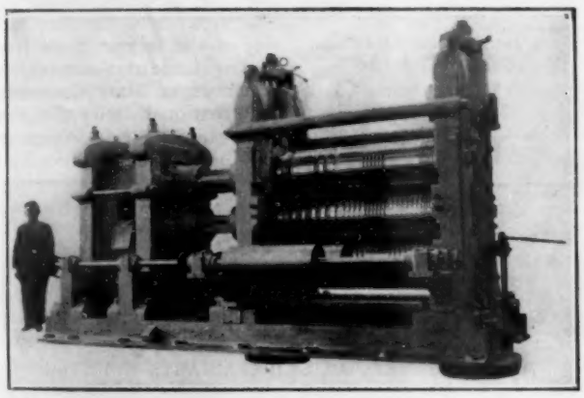
This testing equipment consists of a set of eleven sealed colorimetric tubes with stable colors range pH 5.6 to pH 7.6, with instructions, which, by a very easy method, give an accurate conception of the amount of acid or alkali a bath contains. For determination of metal a simple and easy test is introduced by the use of a standardized nickel solution against the solution being tested from any tank. The length of time necessary for a complete determination is about four minutes for the degree of acidity, as well as the metal in solution; also data as to the correcting of any condition, such as replacing metal that may be required, telling the actual pounds or ounces of nickel salts that are required to be placed into bath to bring it back to standard.

This testing outfit is made by The Electro Chemical Laboratories, Montclair, N. J.

BREAKING DOWN MILL FOR COPPER RODS

The Farrel Foundry & Machine Company, Ansonia, Conn., has in the last few months completed the production of a modern copper rod mill. The illustration shows the three high breaking down mill which, furnished in connection with this outfit.

The rolls are each 20 inches diameter by 72 inches face, and suitably grooved. The housings are of semi-steel, made with removable caps to facilitate roll changes. The bottom roll adjustment is effected by conveniently locater wrenches, one of which is shown in the photograph, through vertical shaft and gearing connected to the bottom roll adjusting screws. These gears are housed as shown for protection against scale.



20"x72" 3-HIGH BREAKING DOWN ROD MILL

The pinions have cut double helical teeth and are fully housed. An oil pan is provided into which the bottom pinion dips, in order to insure constant lubrication to all of the pinions. Power driven floor rolls were supplied, as shown, to facilitate the return feed.

The entire unit is mounted on substantial rails or stringer bedplates, as shown, and the unit throughout is said to be of the latest and most substantial design in every respect.

UDYLITE PROCESS FOR WALL ANCHORS

A new field for the Udylite Rust Proofing Process has been found in the protection of the steel anchors or supports embedded in stone and Terra Cotta for structural purposes.

Corrosion of metal anchors holding sections of stone and Terra Cotta to the masonry on buildings has always been very difficult to prevent. In a number of cases rusted supports have permitted pieces of Terra Cotta to fall from the face of buildings, endangering pedestrians. The attention of leading manufacturers has been turned to making supports of ample strength and protecting them against corrosion more thoroughly.

The Udylite Process of Rust Proofing consists of electroplating iron or steel with a coating of cadmium about .0004 of an inch thick. It is stated that standard salt spray tests conducted by the Laboratories of Chicago show that a coating of cadmium .0002 to .0003 of an inch thick resists corrosion three times as long as a similar coating of zinc laid on by hot galvanizing. Samples of Sherardized metal with a zinc coating .0009 of an inch thick—three times as thick as the cadmium coat—will break down under the same tests in half the time it takes to penetrate the cadmium coat.

Another advantage claimed for the Udylite process is found in the fact that no allowonce is necessary for the plated coating on threads. When other processes are used threads often become clogged and re-threading is necessary. This, of course, destroys the protective coating at a point where protection is most needed. The cadmium coating, it is said, does not clog the threads.

Still another important point claimed is the strong adhesion between cadmium and the iron and steel. This bond is said to be so close that it is practically impossible to remove the coating by physical abuse, and so ductile that it will peen under a blow, instead of flaking, chipping or cracking, as is the case with zinc plating. This property is of great value in view of the fact that anchors may be subjected to distortion in the adjustment of the building.

Plants for the application of the Udylite process are in operation in several parts of the country where builders can have anchors and other loose iron sent for treatment. The main office is the Udylite Process Company, Kokomo, Ind.

EQUIPMENT AND SUPPLY CATALOGS

Welding Electrodes. General Electric Company.

Fuses. Trico Fuse Manufacturing Company, Milwaukee, Wis.

Teaching Safety to New Employees. National Safety Council, Chicago, Ill.

Fans and Blowers. Bulletin No. 1801, of the American Blower Company, Detroit, Mich.

Metal Cleaner. Hanson & Van Winkle Company, Newark, N. J., describing Roylite Cleaner.

Grinding and Mixing. Bulletin No. 18 and 19 of the Hardinge Company, of New York.

"How to Order Brass." Suggestions and directions from Chase Metal Works, Waterbury, Conn.

Chempur Tin. Capper Pass & Son., Ltd., Bristol, England. Description of its properties and advantages.

Cleaning Service—A description of the services rendered by the Magnus Chemical Company, Brooklen, N. Y.

Real Roofings—Copper & Brass Research Association, New

York. General information on roofs and advantages of copper roofs.

Permold Casting. A sample aluminum alloy casting from the Permold Company, Cleveland, Ohio, made in permanent molds.

Wire Cloth—Newark Wire Cloth Company, Newark, N. J. Descriptions and illustrations of wire cloth of all types and for all purposes.

Portable Elevators and Lift Trucks. Bulletins 100, 101, 103 and 300 covering equipment made by Barrett-Cravens Company, Chicago, Ill.

Electric Cleaning. The Jantz & Leist Electric Company, Cincinnati, Ohio. Electric system for cleaning paint, varnish, and metal containers generally.

Grinding, Buffing and Polishing Machinery. Catalog 315 and Bulletin 600 from the Cleveland Armature Works, Cleveland, Ohio, is ready for distribution.

Brass Data Book. Bridgeport Brass Company, Bridgeport, Conn. Contains prices and weights of sheet, rod, wire, condenser tubes, and seamless brass and copper tubes.

New Haven Railroad-Manufacturers' Association of Connecticut, Inc., Hartford, Conn. The story of co-operation between transportation and industry in New England in refinancing the New Haven Railroad.

American Telephone and Telegraph Company. Annual Report for 1924; also Telephone Almanac for 1925, a compendium of fascinating information about the telephone, its invention, development and present importance.

Dust Arresters—Bulletin No. DA-102 contains the advantages of using "Norblo" dust-removal equipment for foundries, sand-blasts, cement plants, lime plants, etc. Manufactured by Northern Blower Company, Cleveland, Ohio.

"Hilger Istruments"—A brief description of the technique of spectrum analysis, with particular reference to analysis by spectrography, has been published by Adam Hilger, Ltd., 75a Camden road, London, N. Y. 1, England.

Scenes in Algeria, Tunisia and Sicily. Letters from D. C. Ball, president of the Oakley Chemical Company, New York, describing his experiences on his trip abroad. The booklet is very interestingly illustrated with photographs.

Power Transmission Machinery—General Catalog No. 30, issued by the W. A. Jones Foundry & Machine Company, Chicago, contains 448 pages of power transmission machinery data, including cut gears, cast gears, spur gear speed reducers, etc.

Cranes—A folder of the various bulletins and catalogs issued by the Northern Engineering Works, Detroit, Mich., describing and illustrating their line of cranes and material handling devices and accessories. The bulletins are profusely illustrated, and include much engineering data.

"Fescolizing"—No. 11. A booklet, giving a few data of practical and commercial results after "Fescolizing," has been published by Fescol, Limited, London, S. E. 15, England. This booklet is well illustrated. A reprint entitled "Cheating the Scrap Heap" has also been published by the above company.

ASSOCIATIONS and SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

AMERICAN FOUNDRYMEN'S ASSOCIATION

HEADQUARTERS, 140 SOUTH DEARBORN STREET, CHICAGO, ILL.

As stated in the March issue of THE METAL INDUSTRY, the the 1925 convention will be held in Syracuse, N. Y., October 5-9, inclusive.

Through the courtesy of the New York State Fair Commission, the American Foundrymen's Association was tendered the use of buildings on the State Fair Grounds, providing in excess of 100,000 net square feet of exhibit space where exhibits of any character can be installed and operated.

The grounds are located within twelve minutes auto ride of the hotel district, with trolley and bus line service.

All activities, registration, business and technical meetings and exhibits will be at the Fair Grounds, where arrangements have been made for good restaurant service.

DAIRY BUILDING AND COLONNADE

Syracuse is within one night's ride from all New England, Philadelphia, Baltimore, Pittsburgh, Cleveland and Detroit districts and all points in the Provinces of Ontario and Quebec. It is more convenient to foundrymen of the United States and Canada than any of the other cities considered.

Syracuse entertains annually one of the largest State Fairs in the country and has housed many large conventions, the most recent ones being the 1924 Democratic State Convention of four days' duration and the International Dairy Congress and National Dairy Show in 1923. Usually this association

MANUFACTURERS AND LIBERAL ARTS BUILDING

demands greater hotel accommodations than does our own and since they met in Syracuse, a new 600 room hotel, every room with bath, has been added. The Chamber of Commerce has an efficient convention housing bureau. They will organize a convention committee to co-operate in securing reservations for members and guests.

At a conference attended by representatives of the Chamber of Commerce, Hotelmen's Association and the American Foundrymen's Association, it was mutually agreed that no reservations would be made by Syracuse hotels until some date to be determined later. In the meantime, all members and exhibitors will receive complete hotel information, rates, etc., and a special form to be used in making reservations. It is believed that this plan, which has been given considerable thought and is a result of past experience, will secure the maximum of comfort for all.

NATIONAL ASSOCIATION OF BRASS MANUFACTURERS

HEADQUARTERS, CARE OF W. M. WEBSTER, CITY HALL SQUARE BUILDING, CHICAGO, ILL.

The Spring meeting of the National Association of Brass Manufacturers was held on March 10-12, 1925, at the Chamber of Commerce Building, Washington, D. C., with headquarters at the New Mayflower Hotel.

The first day's session was given over to the work of the Catalogue Committee, followed by various other committees and after a three days' busy session concluded on Thursday the 12th.

The Standardization Committee tendered an interesting report, recommending in a tentative way the following weights for Thumb Screw pattern and Automatic Type of Stops and Stop and Drains or Wastes:

Style	½ in.	¾ in.
Thumb Screw, less S. B.....	17 oz.	19½ oz.
Thumb Screw, with S. B.....	18½ oz.	21 oz.
Automatic Type with S. B.....	21 oz.	25 oz.

The committee further recommended the elimination of the 5/8" size as it was considered unnecessary; reaffirmed the ¼" size for all loose key work.

Among the more important matters enacted at the General Session was the naming of the following standing Committee on Research: Karl Legner, Chairman, Pennsylvania; E. A. Eckhouse, Ohio; Harry Speakman, Delaware; H. C. Bulkely, Illinois; L. D. Lawnin, Missouri. Their duties are to receive and consider all matters pertaining to shop practices, up-to-date foundry equipment and modern methods of production, and as matters are brought to their attention study will be given and recommendations made to the membership along these lines.

The financial report tendered by Commissioner Webster indicated a healthy condition of the treasury.

The most interesting matter taken up was the summary of replies received on survey made by Commissioner Webster on the business situation for 1924, covering percentage of profit or loss on sales of year; profits on capital invested; percentage of sales on capital; turnover on invested capital; percentage of cost in selling goods; whether the Federal Income Tax was part of the cost and other interesting details, all of which was divided into different zones and then under different codes. This, however, was not made known at the general meeting, but given to the individual members who contributed information on the above matters.

The next meeting of the association will be held on June 9, 10 and 11, in Chicago.

WASTE MATERIAL DEALERS

HEADQUARTERS, TIMES BUILDING, NEW YORK

ANNUAL MEETING

The Twelfth Annual Meeting of the National Association of Waste Material Dealers, Inc., was held at the Hotel Astor, New York, on Wednesday, March 18th, the meeting being called to order by President DeGroat, at 11 A. M. The attendance was the largest which the association has known at any annual meeting. The treasurer's report showed that the association was in a sound financial condition, with every prospect that the coming year would be one of the best ever experienced by the organization. The secretary's report, which appears elsewhere in this issue, showed that seventy-five new members had been elected, while the secretary also reported that in addition to this number of new members there were on hand at the present time twenty-five applications yet to be acted upon by the board of directors.

EGMONT L. FRANKEL
President

After the various reports had been read and adopted the meeting proceeded to elect a president, fifteen directors for two years and one director for one year to fill a vacancy caused by the resignation of George B. Smitheman. The ticket as nominated and elected was as follows:

For president .....Egmont L. Frankel

For directors for two years—Harry R. DeGroat, Frank C. Overton, Fred W. Reidenbach, Stuart B. Sutphin, Walter Schoenbach, Joseph Michaels, George M. Graves, Isidore Klous, Fred Mayer, Morris Gintzler, A. Glant, Mark B. Speer, A. J. Moran, E. H. Silberman, D. A. Singer.

For director for one year—Albert T. Hicks.

Following the annual meeting of the association there was held the annual meeting of the board of directors, at which meeting the following officers were elected.

First vice-president.....Henry Lissberger
Second vice-president.....G. H. Rady
Third vice-president.....Edw. B. Friedlander
Treasurer.....Charles M. Haskins

MEETING OF THE METAL DIVISION

A meeting of the Metal Division was held at the Hotel Astor on Tuesday, March 17th, the meeting being called to order at 3 P. M., by the chairman, Egmont L. Frankel. Practically all of the discussion at this meeting had to do with suggested changes in the metal classification and a method of sampling shipments of battery plates. As a result of the discussion it was finally voted that the chairman appoint a committee of three to examine into the subject of the best method of sampling shipments of battery plates and that the classification committee should temporarily be increased by the addition of other members to handle the changes in the classification. As a result of the two motions carried the chairman made the following appointments: Committee to suggest method for sampling battery plates: Walter Schoenbach, of Metals Refining Company; Mr. Axelrod, of the Girard Smelting & Refining Company; and Mr. Lesser, of Goldsmith Bros. Smelting & Refining Company. To take up the subject of changes in the classification, the present classification committee: F. W. Reidenbach, Clarence B. White, Ivan Reitler, Fred Mayer, and in addition, Harry Birkenstein, Henry Shambroom, Henry Levitt, David Feinburg, Samuel Greenfield. The above committee plan to hold a meeting on or before May 5th.

The Metal Division also voted that its chairman should cooperate with the chairmen of other divisions in the drawing up of a uniform purchase and sales contract.

TWELFTH ANNUAL BANQUET

The association's Twelfth Annual Banquet, which was held at the Hotel Astor, New York, on Wednesday evening, March 18th, was a pronounced success. In attendance it broke all records by over a hundred and fifty, the attendance being over six hundred.

There were sixty-three tables set in the above room, which is two hundred feet long, and with the elaborate decorations, the attractive menus, a high-class orchestra and a fine quartette it was only natural that a good time was to be anticipated. It ought to be mentioned also that the dinner served was thoroughly in keeping with the fine record which the Astor has for knowing how to please in connection with the dinners which they serve.

THE METAL INDUSTRY representative, a guest of the association, had the good fortune to be seated at a table of good fellows (typical of course, of the whole association), who made him one of their number at once. Table 45 with N. Sacks, E. M. Paymer, J. J. Paymer, S. S. Paymer, Louis Schiavone, R. P. De Lorengo, Michael Bonomo, Richard V. Bonomo and W. J. Keating helped considerably to make it a pleasant evening.

President DeGroat acted as Toastmaster, and after a few congratulatory remarks in reference to the association's progress, and after complimenting it on the election of Egmont L. Frankel as president, presented to the members and guests assembled Theodore Hofeller, the first president of the association, and one who was largely instrumental in getting it started.

The toastmaster next introduced the new president, Egmont L. Frankel. Following the address of President Frankel, the toastmaster introduced United States Senator Simeon D. Fess, of Ohio, who, after congratulating the new president and the

association, took up at some length the many bills that have been before Congress during the past season. Following Senator Fess' address, Vincent Gilroy of the Arbitration Society of America, gave the members a very inspiring ten minute talk on Commercial Arbitration.

The last speaker of the evening was Judge Harold B Wells, of New Jersey, who has secured guite a reputation as a humorist speaker. Everybody agreed at the close of the banquet that it had been a big success—one of the best banquets ever held by the association.

AMERICAN ELECTRO-PLATERS SOCIETY

BRIDGEPORT BRANCH

HEADQUARTERS, CARE OF R. J. O'CONNOR, P. O. BOX 671

The Bridgeport Branch will hold a banquet and educational session at the Stratfield Hotel, Bridgeport, Conn., on Saturday, April 18, 1925.

The educational session will be in charge of Charles H. Proctor, founder of the American Electro-Platers' Society, and the meeting will be called at 3 P. M. sharp. Interesting papers by various branches on the electro deposition of metals will be read and discussed. The banquet will be held at 7 sharp, followed by dancing.

CLEVELAND BRANCH

HEADQUARTERS, CARE OF B. F. McCORMICK, 2024 WYANDOTTE AVE., LAKEWOOD, OHIO.

The Cleveland Branch appointed a Research Committee. This committee is composed of all practical men with from 25 to 40 years' experience. The chairman of this committee is J. B. Hergist, a graduate chemist with over 25 years' practical experience in plating. It is he who gave us the electro analysis of the brass solution a few years ago, and is an authority on this work. He is recognized in schools of applied science as well as laboratories in this part of the country. The work of this committee, however, is not to be put in book form, sold or given to anyone except to members of the society without the consent of this branch.

NEWARK BRANCH

HEADQUARTERS, CARE OF GEORGE REUTER, 55 REVERE AVE., HILTON, N. J.

The Annual Banquet of the Newark Branch will be held at Stetter's Restaurant, 842 Broad street, Newark, N. J., on Saturday, April 25, 1925.

The afternoon session will begin at 3 o'clock and is free to all who are interested in plating. All are welcome. The banquet will begin at 7 in the evening and the tickets are $3. Dancing and a general good time follows the banquet. The educational program of the afternoon session will consist of talks and papers by the following:

1. "Some Problems I Have Met," Charles H. Proctor.
2. "Cleaners," A. P. Munning 2nd.
3. "Bright Dips," George B. Hogaboom.
4. "Tips on High Speed Electroplating," Royal F. Clark.
5. "Gilding on Watch Cases," George Conley.
6. Wesley A. O'Leary, Assistant Commissioner of Education, will talk upon some of the policies of New Jersey.

Tickets can be procured from George Reuter, 55 Revere avenue, Hilton, N. J.

PITTSBURGH BRANCH

HEADQUARTERS, CARE OF S. E. HEDDEN, 227 FIFTH AVE., ASPINWALL, PA.

Pittsburgh Branch A. E. S. has finally settled on the evening of Thursday, April 17, 1925, for the annual party.

This is an original affair as it is to be given free to all members of the A. E. S. It will be held in the U. S. Bureau of Mines at Pittsburgh which is the regular meeting place of this branch.

There will be a high-class moving picture, a very worth-while dinner and general jollification get-together. Charge—just your good will for the betterment of the A. E. S.

This information is given out by Wilfred S. McKeon, chairman of the Publicity Committee.

ST. LOUIS BRANCH

HEADQUARTERS, CARE OF F. J. HANLON, 216 N. JEFFERSON STREET

H. H. Williams, secretary and treasurer of the St. Louis Branch A. E. S., was given a surprise visit at his home on the evening of March 11, 1925, by his fellow members.

Mr. Williams, who has been confined to his home the greater part of the past four months with sciatica rheumatism, has been missed at our branch meetings so much that the boys decided to bring the meeting to their beloved friend.

He has received numerous visits, flowers, books and even a quantity of magnesium sulphate from different members of the branch, and he appreciated them, but when over half of the local membership came in a body and brought along a beautiful mahogany roll top desk, and in presenting it told him it was but a slight token of their love and appreciation of his untiring efforts in behalf of the St. Louis Branch A. E. S., he was surely surprised.

In his usual characteristic deliberate and calm manner he told the boys how much he really appreciated their visit and their beautiful gift, and that he would be glad to continue to help them and the A. E. S. whenever he could.

We are pleased to report that Mr. Williams is gradually getting back to normal again, and in the near future expects to be back in his busy plating and polishing department.

EXPOSITION OF CHEMICAL INDUSTRIES

HEADQUARTERS, GRAND CENTRAL PALACE, NEW YORK

Arthur D. Little, president of Arthur D. Little, Inc., of Boston, was elected to succeed Charles H. Herty as chairman of the Advisory Committee of the Exposition of Chemical Industrial at a meeting of the committee held at the Chemists' Club, New York, on February 24, 1925. Dr. Arthur D. Little is one of the most widely-known chemical engineers in the United States and one of the pioneers in the modern American chemical industry. He is president of one of the largest research and engineering organizations in the world, the founding of which dates back in 1886. Dr. Charles H. Herty, who resigned from the chairmanship of the Advisory Committee owing to the pressure of other duties, is president of the Synthetic Organie Chemical Manufacturers' Association of the United States. He has been chairman of the committee for ten years, serving since the inception of the Chemical Exposition in 1915. He remains a member of the committee.

One of the features which the committee decided to include in this Exposition, to be held September 28-October 3, 1925, was a Court of Achievement in which those new products of chemical development during the past few years would be shown. These will include a long list of chemicals and synthetics, chemical products and other materials valuable to man in sheltering, covering, treating disease and illness, in transportation, communication and in all the phases of human endeavor. Already above one hundred separate units are decided upon to be included and those having new scientific products which may be suitable for showing in this Court of Achievement should communicate to the Tenth Chemical Industries Exposition, Grand Central Palace, New York, and the communication will be placed before the committee. Fuller details of the plan and methods will be announced later but those interested should communicate at once.

ASSOCIATION OF PURCHASING AGENTS

HEADQUARTERS, CARE OF W. L. CHANDLER, WOOLWORTH BUILDING, NEW YORK

Purchasing agents throughout the United States and Canada are now considering attending the Tenth International Convention of their association in Milwaukee, Wis., May 25 to 28, 1925, inclusive.

The general convention committee is hard at work preparing for the big event, and is now sending out a call to all parts of the continent for information as to how many will be on hand for the sessions and the festivities. All who propose to attend are asked to inform the general chairman, Walter H. Wenzel, of the Vilter Manufacturing Company, 935 Clinton street, Milwaukee, so that the arrangements can be made on a sufficiently large scale to care for all. The committee asks that this notification be made at once, so that its plans can be perfected.

AMERICAN WELDING SOCIETY

HEADQUARTERS, 29 W. 39TH STREET, NEW YORK

The annual meeting of the American Welding Society will be held from April 22-24, 1925, at 29 W. 39th street, New York. Details can be obtained from the secretary at the above address.

Personals

ARTHUR F. BRAID

Arthur F. Braid, sales manager of the metal and alloy department of the Metal and Thermit Corporation, New York, was born in Glasgow, Scotland, March 13, 1884. He attended the military schools, the Glasgow High School and the Dollar Institution of that city, and entered Glasgow University in 1901. He was graduated in 1905 with honors in chemistry.

ARTHUR F. BRAID

Following his graduation, Mr. Braid spent one year in London as chief chemist at the Stratford plant of the Charing Cross West End and City Electric Supply Company. The following year he was employed as metallurgical engineer with the Associated Portland Cement Manufacturers at their laboratories in Gravesend, Kent, England.

In August, 1907, came out to Montreal, Que., and was employed by Dr. Milton Hersey, Government Assayer for the Province of Quebec. After a few months there, he went up to Temagami, near Cobalt, to take the position of Metallurgist at the Temagami Mining & Milling Company. The following year he came to Sewaren, N. J., as assistant manager of a new type of smelter for the reduction of arsenical ores.

In the summer of 1909 was appointed Metallurgist of the New Jersey Steel Casting Company, located at Rahway, N. J., and in the early part of 1911 he was appointed Metallurgist in charge of grey iron reduction with the M. Rumely Company, Laporte, Indiana.

In October, 1911, Mr. Braid became affiliated with the Goldschmidt Thermit Company as Metallurgical Sales Engineer. In 1914, during the World War, the Metal & Thermit Corporation, successors to the Goldschmidt Thermit Company, decided to produce metals and alloys in this country by the aluminothermic process. Mr. Braid took charge of this work for about three years, and in 1917 was appointed sales manager of the metal and alloy department. He holds this position at the present time.

Mr. Braid is a member of the following societies: Institute of Metals Division, A. I. M. E.; American Iron and Steel Institute; American Foundrymen's Association; American Society for Testing Materials; American Electrochemical Society; British Institute of Metals; American Society of Steel Treaters.

Dean Welch, a director of the **Bristol Brass Corporation**, Bristol, Conn., since 1905, was re-elected at the annual meeting in February this year.

O. C. Martin sailed for London, England, recently and will be absent a number of weeks. Mr. Martin was formerly an official of the **Nichols Copper Company**, New York.

A. Kortum, Sr., late of the **New York Buff Company** and the **Kortum Buff Company**, is now connected with the **Oden Corporation**, New York, as sales engineer.

W. S. Race has joined the **Miller-Hurst Corporation**, foundry and industrial engineers. Mr. Race was formerly with the United States Rubber Company, having worked in their New York and Detroit offices.

J. M. Heaton, of 428 Fisk Building, 1767 Broadway, New York, formerly branch manager for greater New York, has been appointed distributor for the complete line of **Lapeer Semi-Trailers**. Mr. Heaton will have greater New York for his territory.

Alfred W. Lockwood has joined the sales organization of the **Bridgeport Brass Company** as a special representative, operating out of the New York office, handling brass pipe and flush valves. For some years past he was connected with Cauldwell, Wingate & Company, New York contractors.

Lyle Marshall, former manager of the Service Department of the **Industrial Works**, Bay City, Mich., and later connected with the Chicago office of that company, has recently been appointed district sales manager, with new offices at 619 Dixie Terminal Building, Cincinnati, Ohio.

James E. Shearer, assistant sales manager of the **Industrial Works**, Bay City, Mich., has moved his headquarters from the home office to the Industrial Works' New York office, 50 Church street, that city. George T. Sinks, in charge of the New York district, will remain in that position.

C. P. Coleman, president of the **Worthington Pump Company**, New York, has been appointed head of the Metals and Machinery Division, organized to solicit funds for the coming home service appeal for the Salvation Army in Greater New York.

Bernard Clark, for several years past, resident Philadelphia manager for the **Waterbury Brass Goods Corporation**, Waterbury, Conn., has resigned his position to associate himself with **T. C. Smith & Company** of Philadelphia, Pa., manufacturers of electrical specialties.

H. M. Johnquest, formerly chief chemist of the Manufacturing Division of the **Chase Companies, Inc.**, Waterbury, Conn., has installed an office and laboratory at 42 Bank street, Waterbury. He is handling general analytical work and acting as a consultant in electro deposition, finishes and factory problems, for concerns not maintaining their own laboratories.

Burton G. Daw announces his resignation from the **Hanson & Van Winkle Company**, Newark, N. J., which is to take effect May 1, 1925. Mr. Daw worked out of the Chicago office as a salesman for five years before going to Cleveland as district manager, which position he has held for the last two and one-half years. He has not definitely decided on his future plans at this time.

Dr. Richard Moldenke has returned from an extensive European trip made to study the synthetic ammonia situation there, having visited the German and Italian plants showing the latest developments; also aluminum plants. During the next few months he will aid the technical development of the Detroit Aerometals Company until they get their processes perfected, continuing his consulting practice in the foundry field.

Charles N. Brooks has retired after 45 years' service with the warehouse firm of **Bruce & Cook, New York,** with which he rose from office boy to cashier. The officers and employees of the company gave a dinner recently in his honor, at the Meyers' Rathskellar, Woolworth Building. Among those who were at the speakers table were J. Judson Trappan, G. A. Ellison, Albert J. Douglass, Rev. William Keele, Hon. G. A. Massett, representative from East New York. J. G. Fuchs was chairman. Mr. Brooks was presented with a fully equipped traveling bag.

Matt J. Herold has been appointed general sales manager of the **United States Electrical Tool Company,** Cincinnati, Ohio. Mr. Herold was first employed by this company about 20 years ago, becoming one of its traveling salesmen, and helping considerably in the pioneer work of introducing portable electric tools and grinders. Since 1910 he has been engaged in various industries as sales representative and district manager. He has now been called back to his old company as general sales manager. His experience has been broad and he is a specialist in the automotive field.

Obituaries

WILLIAM ANDREWS CLARK

William Andrews Clark, formerly United States Senator, died early in March. He was one of the great copper magnates of the country, having been prominent in the development of the Montana copper district. He was prominent in the American Institute of Mining and Metallurgical Engineers, and a notable collector of works of art.

HERBERT MANTON UPSON

Herbert Manton Upson, assistant treasurer and credit manager of the Chase Companies, Inc., Waterbury, died at his home in Thomaston, Conn., March 19, 1925. Death came suddenly from septic pyelitis, following an infection in the nose.

He had been associated with the Waterbury Manufacturing Company (the original nucleus of the Chase Metal Works and the Chase Companies), for the past 37 years. He was born April 4, 1873, in Wolcott, the son of Leroy Upson and Ardelia Tuttle.

He leaves his wife, Mrs. Marie Woodruff Upson, and three sisters, Mrs. Martin W. Hall of Waterbury, Mrs. W. T. Holmes of Tougaloo, Miss., and Mrs. John L. Scott of Watertown, Conn.

HAROLD W. PICKETT

Harold W. Pickett, 52 years of age, assistant treasurer of the New Haven Copper Company of Seymour, Conn., died at the Griffin Hospital, Seymour, Conn., March 15, 1925. He had been operated upon and it was believed that he was recovering but a relapse occured.

He had been with the company for 30 years, first as bookkeeper and lately as assistant treasurer. He was known as one of the most faithful and efficient men in the company's employ. He was a member of Upson Camp, Sons of Veterans, of Seymour, and active in Masonic circles, and was a communicant of the Trinity Episcopal Church of that place.

Mr. Pickett is survived by his mother, Mrs. Annie Pickett, and a sister, Sarah Pickett, both of 38 Derby avenue, Seymour, and a brother, Charles, of New Haven.

NEWS OF THE INDUSTRY

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

WATERBURY, CONN.

APRIL 1, 1925

A slight slackening up in the metal industries has been noticed in Waterbury and the Naugatuck valley in the past month, but business conditions, as a whole, are reported to be sound. The monthly review of the New England district, United States employment service, states of Waterbury:

"Industrial employment conditions improved during the month of February. Practically all industries are operating on full time and there is little unemployment, although a slight slackening occurred in the metal industry during the month. Building activities continued brisk.

F. S. Chase, president of the **Chase Companies,** presided at the monthly dinner of the traffic bureau of the local Chamber of Commerce, March 26. **T. C. Powell,** vice-president of the Erie Railroad, spoke upon "The Effect Upon Transportation Through the Shifting of Commerce." **E. Kent Hubbard,** president of the Connecticut Manufacturers' Association, spoke on "The Relation of the American Railroads to Industries."

The **Chase Foremen's Association** was formally incorporated at the regular meeting of the association, last month, at which 150 members were present. A charter received from the secretary of state at this meeting, although it has existed as an organization several years.

New officers elected are: President, **Vincent Conway;** vice-president, **Thomas Baker;** secretary, **Patrick Shea;** treasurer, **Walter Jaeger;** directors, George Spurway, James Sweeney, Herbert Ludlow, William Stillwell, A. T. Crane, Timothy Ferris, Daniel McNamara, Ray Palmer, Victor Hedberg; auditors, Larry Breen and Edward Connell. A schedule of bowling matches have been arranged with the Elks, the Stanley Works and the Aetna Life Insurance Company.

John P. Elton, former vice-president of the **American Brass Company,** was chosen president of the Lincoln House Association for the twelfth time, at the annual election of the association, last month. **Roger S. Sperry** of the **Scovill Manufacturing Company** was chosen vice-president.

A new manufacturing company, the **Concannon Shears Company,** has been organized in Naugatuck, just outside of Waterbury. The company will manufacture shears and scissors and has leased one of the buildings of the United States Rubber Company to commence operations. **W. F. Concannon,** chief organizer of the company, holds a number of patents on shears which are to be used by the concern. **William T. Rodenbach** was elected president and **Victor N. Peterson,** secretary and treasurer. The directors are: E. P. O'Brien, J. W. Biggin, D. E. Shea and P. Concannon.—W. R. B.

BRIDGEPORT, CONN.

APRIL 1, 1925

Henry E. Kauffman of New York, representing the **American Woolen Company** and the **Marshall Field Company** at hearing before **Referee John Keogh** here, on the matter of passing upon claims against the **Bridgeport Iron & Metals Company,** moved that auditors be appointed to make an investigation of the outstanding accounts on the company's books.

The referee declared, however, that there would be no investigation at the expense of the estate as he had never known an investigation that showed beneficial results for the creditors. The trustee, **Henry Greenstein,** has made every possible effort to collect all outstanding claims, the referee said, and further investigation could only gratify curiosity, and "make another graft job for lawyers who feed on bankrupt estates."

Holmes & Edwards of this city, one of the branches of the **International Silver Company,** has issued the following statement regarding the stock suit brought against the company in New York because of the purchase of **Colt's Arms** property for shares of stock.

"The action appears to involve the same transaction and the same questions as a similar action brought by **Sidney** C. Borg

and others in June, 1924. The transaction involving the purchase of the Colt Arms property for 2,500 shares of the common stock of the company, then held in the treasury, was authorized and approved by a quorum of directors who had no personal interest in the transaction and were of the opinion that the value of the Colt Arms property exceeded materially the value of the 2,500 shares of stock and that the terms of the purchase were highly advantageous to the company. The Colt Arms property has been improved and equipped by the company and is now in actual operation. The claim of the plaintiffs that the common stock held in the treasury of the company had been retired or should have been retired and could not be transferred or sold has been rejected in a decision by **Judge Henry W. Goddard** of the United States District Court in the former action brought by Mr. Borg."

Refinancing of the **Siemon Company** of this city means substantial expansion of the plants of the company not only in Bridgeport but also in Hoosic Falls, New York, where the firm owns two subsidiaries, it is stated by the local office of the firm. The capital of the concern, after the financial reorganization, will consist of 10,000 shares of no par value common stock and $500,000 in preferred $100 par value shares. Growth of the radio industry is responsible for the reorganization, **Carl F. Siemon,** president of the company, announced. Besides himself, Waldo C. Bryant, Edgar C. Bassick and John S. Pullman will be numbered among the new board of directors. The output will consist of all types of radio materials and synthetic insulating materials.—W. R. B.

TORRINGTON, CONN.

April 1, 1925

Concerning reports that the **Trumbull-Vanderpoel Company** is to move its plant from Bantam to Torrington, **John H. Lancester,** treasure of the company, says: "These rumors are emanating from sources other than the company. We are up against an expansion problem and must build in Bantam or elsewhere. There is possibility that we may locate in Torrington but the whole subject is still under consideration and up to the present no definite action has been taken." The employes of the Trumbull-Vanderpoel Company are largely Torrington people who go back and forth each day. Bantam is about ten miles from Torrington.

At the annual meeting of the **Fitzgerald Manufacturing Company** held the past month, the following were elected: President, P. J. Fitzgerald; treasurer, M. F. Fitzgerald; vice-president, M. D. Fitzgerald; secretary, B. G. Peck. A dividend of 8 per cent on the preferred stock was declared, payable semi-annually, March 16 and September 16.

Albert Croft, age 63, for 49 years employed by the **Excelsior** plant of the **Torrington Company,** died March 13.

Schedules conforming with daylight saving probably will be adopted by Torrington factories on April 26, on which date the railroad schedules are to be advanced one hour.

E. Kent Hubbard, president of the **Connecticut Manufacturers' Association,** spoke on the railroad situation in New England before the members of the Torrington Club on March 23. The moving pictures produced by the **Anaconda-American Brass Company** on "The Copper Industry from the Mine to the Consumer" were shown at the club on March 16 and were highly interesting and instructive.

A reduction of three-mills in the city tax rate has been made by the city council and board of finance.—J. H. T.

NEW BRITAIN, CONN.

April 1, 1925

Generally speaking, business conditions among the larger of the local hardware manufacturing concerns is good, although there is no pronounced boom of activity. In almost every instance, however, factories are maintaining their average working schedule in all departments, and while there is not much employment to be offered the jobless, nevertheless there seems to be work enough for those on the rolls. The foreign market, which has been somewhat uncertain, continues that way, but with every indication of a pick-up before long. The South American market also holds forth promise.

Going through the list of the various local concerns one finds but little out of the ordinary on which to comment. The **P. & F. Corbin** plant of the **American Hardware Corporation** is handling an average amount of output; the **Russell & Erwin** branch is ordinarily busy, especially with its local production; the **Stanley Works** are working steadily. The allied concern, the **Stanley Rule & Level Company,** reports a little more brisk demand for builders' tools. **Landers, Frary & Clark,** as usual, is going at almost top speed. While the cutlery departments are not being rushed to capacity, other branches are, especially the electrical departments and the aluminum ware branches. **Landers, Frary & Clark** are rapidly developing an extensive electrical appliance business that already is one of the largest in the country. **North & Judd Manufacturing Company,** still feeling the effects of reorganization here and there, is maintaining a good average with its metal novelties output and the same holds true of the **Traut & Hine Manufacturing Company.** The **Humphrey Manufacturing Company,** organized within the year, is meeting with pronounced success with its line of small metal novelties.—H. R. J.

PROVIDENCE, R. I.

April 1, 1925

Manufacturing plants throughout Rhode Island, connected with the metal trades are generally busy, although part time still obtains in some of the lines. Building operations continue active with promise of improvement and a scarcity of skilled workmen in these lines is reported. In the jewelry lines conditions remain the same as since the holidays and the present outlook is not as encouraging as the manufacturers would wish. The jewelry industry and its affiliated branches has had a long and precarious period of dull business.

One of the most important changes that have occurred in the manufacturing jewelry industry here in a long time was the consolidation of the **Chapin & Hollister Company** and the **Markham & Stone Company.** The latter plant has been removed to that of the former company and the charter of the former changed so that the consolidated firm is now the **Chapin-Hollister-Stone Company** and the capital stock has been changed from $30,000 to 1,000 shares of common stock without par value. **Frank R. Hollister** is president of the new concern; **William P. Chapin,** vice-president; **Ralph K. Stone,** treasurer and general manager, and **John H. Stone,** superintendent and secretary.

David Barrette, assistant foreman at the **Hillsgrove Foundry,** died February 19 at his home, 11 Cottage street, Hillsgrove, in his sixty-eighth year. He had been employed at the foundry for the past thirty-one years. Besides his widow, he is survived by five sons and four daughters.—W. H. M.

MIDDLE ATLANTIC STATES

ROCHESTER, N. Y.

April 1, 1925.

Although the month of March has seen some slight improvement in the regular job work business of the various brass-molding and metal-working plants about Rochester, it is declared that there has been no real brace in business metals since the beginning of the year. There are no reports of additional employment about the city, and, in fact, many metal workers feel that they are fortunate in being on pay rolls. From talks with persons in authority in several of the larger manufacturing plants about the city, the immediate prospect of business improvement is not promising. There appears to be a disposition to await developments, and disappointment over what was fondly expected to be a business boom.

With no new enterprises planned a number of metal workers are meditating leaving the city or engaging in other businesses. The unusually heavy building operations in Rochester, especially in the downtown and business sections of the city, are helping to stimulate a decidedly drooping trade in metals. Dealers report a fairly active trade in brass sheets, rods and tubing. Pig aluminum and copper sheets are also in very good

demand. But the bulk of it is for building purposes. Electroplating in the various large manufacturing plants is said to be quite brisk.—G. B. E.

NEWARK, N. J.

April 1, 1925

On complaint of **Alexander Mellam,** Vice-Chancellor Church has ordered the **Artistic Metal Products Corporation,** of 145 Jackson street, to show cause why a receiver should not be appointed. The company, in a notice sent out, admitted its insolvency and inability to meet its obligations, and stated that is had ceased to operate because of lack of funds. Its liabilities are fixed at approximately $34,000 and the assets at $14,000. The company was incorporated in January, 1922, with an authorized capital stock of $100,000 and possesses no real estate.

Equity receivership proceedings have been brought in the federal court by **William J. Robb,** of Tuckahoe, N. Y., against the **Noxon Chemical Company,** of 70 Morris avenue. Mr. Robb is treasurer of the Noxon Company and is a director in the **Judkins and McCormick Company,** 385 Madison avenue, New York, which alleges the Noxon Company owes it $59,000. Federal Judge Runyon appointed Charles R. Leckie and Archie M. Ormond, equity receivers.

Giving liabilities aggregating $134,400, inclusive of capital stock, liabilities of $69,400, as against assets estimated at $75,000, the **Holley Manufacturing Company,** engaged in the manufacturer of radio parts at 179 South street, has consented to the liquidation of its affairs through a receivership. The concern's plight was brought to the notice of vice-Chancellor Church through counsel for the **American Nickeloid Company,** an Illinois corporation, and the **American Radiophone & Manufacturing Company,** a New Jersey concern. Francis Child was appointed receiver.

Philip Woolf, manufacturing jeweler, of 412 South Fourteenth street, filed a petition in bankruptcy in the federal court. He claims assets of $30,000, but made no mention in the petition of liabilities. David Bobker was named receiver.

Newark concerns charted included the following: **Eagle Tube Company,** radio supplies, $50,000 capital; **Butterworth-Judson Chemical Works, Inc.,** chemicals, $5,000; **Nassau Sales Company,** manufacture copper, $100,000; **Fisher Balanced Circuit Radio Company,** radio supplies, $50,000 capital.—C. A. L.

TRENTON, N. J.

April 1, 1925

Business continues good at the metal industry plants at Trenton and the manufacturers are looking for a good summer. The **John A. Roebling's Sons Company** has begun the erection of a new addition to the Clark street plant to cost $30,000. The building will be one story, 158 by 96 feet, and of steel, brick and concrete. The **Federated Metals Corporation,** of New York City, has begun the erection of a new plant here. The building will be 80 by 200 feet, of steel frame and concrete. It will cost $36,000. The **Trenton Emblem Company** reports business on the increase with many new orders on hand.

The **Nassau Radio Corporation,** of 80 Nassau street, Princeton, has been chartered here with $50,000 capital to manufacture radio parts. The incorporators are John D. Keener, Myrtle Keener and Catherine K. Shunk.

William L. Schulte, president of the **Trenton** Brass and **Machine Company,** gave an interesting talk on "Brass and Bronze" to the members of the Trenton Rotary Club recently.

The **C. Howard Hunt Pen Company,** of Camden, N. J., will shortly add two new industries to the present factories. The company has purchaser the **Boston Pencil Pointer** Company, of Waltham, Mass., and the **Boston Specialties** Company, of New York. The work of both these companies will be transferred to the Camden plant in a few months. The Hunt company will operate the plant in Massachusetts until final plans can be made to move it to Camden. About 100 additional employes will be engaged. Pencil pointers, knife sharpeners and various other articles will be manufactured.

W. R. Hughes Corporation, of this city, has been chartered with $25,000 capital to manufacture bathroom fixtures. William G. Bechman, of Pittsburgh, is at the head of the new concern.

The following concerns have been chartered at Trenton: **Franklin Radio Company,** radio supplies, $125,000 capital, Asbury, Park, N. J.; **Central Storage Battery Company,** storage batteries, $125,000, Elizabeth, N. J.; **Silmo Chemical Company,** manufacture chemicals, $50,000 capital, Vineland, N. J.; **Electrical Supply and Radio Corporation,** electrical supplies, 25,000 shares, Jersey City.—C. A. L.

PITTSBURGH, PA.

April 1, 1925

The **General Fireproofing Company,** of Pittsburgh, Pa., is operating its metal furniture department at capacity, and reports increasing demand for fireproofing building materials, with heavy spring demand in sight.

It has been announced recently, that **Bartlett-Hayward Company,** of Baltimore, extensive manufacturer of metal equipments of various kinds, has been sold to the **McClintic-Marshall Construction Company,** of Pittsburgh. The price was not disclosed. The last annual statement issued by the company last April listed the total assets at $16,251,302. Howard **Bruce,** president of the Bartlett-Hayward Company, affirmed reports of the sale but declined to reveal the terms or other details in connection with what is considered the largest local industrial transaction in recent years.

The Bartlett-Hayward Company was established 95 years ago as a stove manufacturing company. Since then it has become one of the most extensive manufacturing plants of its character in the country. During the world war it was a munition plant. It now manufactures agricultural gas company equipment, heating equipment, metal windows, piston rings, and other products of similar character.—H. W. R.

MIDDLE WESTERN STATES

DETROIT, MICH.

April 1, 1925

The building of **Moynahan & Duchene, Inc.,** Detroit manufacturers of brass, iron and bronze fittings, has been remodeled after its recent fire that caused a damage of about $30,000.

The **Mueller Brass Company,** at Port Huron, reports orders ahead sufficient to keep it busy for a number of months. It now employs 675 men. It expects to increase this number when a third shift is added to the tube mill.

It is announced that **Fred Glander** has purchased a factory site in Owasso, Mich., for the manufacture of brass and aluminum castings. He recently retired from the **Standard Machinery Company** at the same place.

W. S. Dewing has been elected president of the **Kalamazoo Stove Company** to succeed the late **George E. Bardeen.**

It is announced that the **Schwarze Electric Company,** at Adrian, will increase its force to 225 men. The company, which now reports a normal business, is in the market for copper, brass and steel.

The **Wise Industies** at Detroit, now employing 50 men, announce that they will increase this number about 40 per cent. They also are in the market for plating, buffing and polishing supplies. General business conditions are reported improving.

The **Detroit Insulated Wire Company** believes the demand for insulated wire and cable, which has been under normal, considering the general business conditions, will right itself for the better in the spring. The excess of supply over demand that has been prevalent so long in the industry, is gradually approaching an equilibrium, the company finds.

It is announced that the **Pemberthy Injector** Company, which now empploys 275 persons, will increase this number 40 per cent. It further is stated it is in the market for copper and brass ingots.

William Heap & Sons, at Grand Haven, is now working 100 men and reports orders ahead of 1924. It also is reported it will be in the market for brass castings.

The **Harris Sales Company,** 5732 Twelfth street, Detroit, has recently been organized to engage in the manufacture and sale of babbitts and solders. The officers are D. J. Harris, president; H. J. Lindsley, treasurer and general manager, and F. E. Harris, secretary.

Lambert M. Payne on March 1 became district representative of the **D. J. Ryan Foundry Company** of Ecorse, the **Allyne Ryan Foundry Company** of Cleveland, and the **Dean Forging Company** of Muncie, Ind. He formerly was purchasing agent for the **Northway Motor & Manufacturing Company,** Detroit.

The **Commonwealth Brass Corporation** has acquired extensive additional acreage on Plymouth road at the Pennsylvania railway for expansion purposes.

The **Michigan Copper & Brass Company,** at Detroit, reports orders slightly above normal. It will increase its force of 1,050 to 1,400 during the present year.

The **Federal Drop Forge Company,** at Lansing, has recently expended $40,000 for new buildings and equipment. It also is adding a new heavy hammer and shears, and three new electric furnaces for its brass and aluminum forge department. It reports the prospects for good business were never more promising.

The **American Enameled Magnet Wire Company,** at Muskegon, reports orders ahead and is now employing 100 persons.

The **Wilson Art Metal Company** has been incorporated at Lansing for the purpose of manufacturing automobile accessories.

The **Douglas Manufacturing Company,** at Bronson, is now giving employment to 185 persons and is reported in the market for brass and hard rubber.

CHICAGO, ILL.

APRIL 1, 1925

Louis Kuehn, president of the **Milwaukee Corrugating Company,** has announced the purchase of the sheet metal equipment of the **Cicero Chicago Corrugating Company.** A new warehouse has also been opened by the Milwaukee company at 4650 West Harrison street, Chicago. With the opening of the Chicago warehouse and salesrooms, Mr. Kuehn announced the appointment of **W. F. Waller** as general Chicago sales manager. W. F. Watson was placed in charge of sales of Milcor Fireproof Products, such as metal lath, corner bead, casting and base screen.

The **Continental Can Company, Inc.,** has moved into a new plant at 4622-4660 West North avenue. All the branches of the company, including the sales offices, have moved into the modern structure recently completed.

The **Imperial Type Metal Company** recently purchased 26,667 square feet at Fifty-fourth avenue and Eighteenth street for $14,000, as the site for a one-story plant with two-story offices in front, costing $55,000.

Mathiessen & Hegeler Zinc Company has expanded considerably, increasing the directors from three to five and increasing the capital stock from $100,000 to $5,000,000. Bonds to the extent of $2,500,000 have also been issued.

The **Berkman Manufacturing Company,** manufacturers of metal specialties, recently incurred a small loss by fire which broke out in their building at 617-629 West Jackson boulevard. The **Reed-Skeppstrom Company,** tool manufacturers, occupants of the same building, also suffered a small loss from the fire.

The **Advance Manufacturing Company,** 524 Milwaukee avenue, makers of aluminum ware, has announced an increase in stock from $250,000 to $350,000.

The **Dallas Brass & Copper Company,** 820 Orleans street, has added two members to its board of directors, increasing the number from five to seven.

Two bandits recently held up **Thomas Mooney,** manager of the **Auto Brass Manufacturing Company,** 3518 South Michigan avenue, locked him and three employes in a small closet, and escaped with $500 of a payroll.

The **Nagel-Chase Manufacturing Company,** makers of metal specialties, 252-260 West Erie street, recently suffered a small loss when fire broke out in their plant.

The **Colestock Manufacturing Company,** makers of auto supplies, through the architects, Ronneberg and Pierce, has awarded a contract for the construction of a one-story factory building at Montrose and North Francisco avenues, at an estimated cost of $15,000.

Two burglars preparing to haul away more than $10,000 in lead and solder ingots were captured by Chicago policemen recently after they had broken into the plant of the **Monarch Battery Plate Manufacturing Company,** 215 West Illinois street.

Several incorporations of interest to the trade recently chartered by the secretary of state of Illinois include:

Mid Continent Metals, Ltd., 209 South La Salle street. Capital, $100,000; refine and manufacture, buy and sell metals and metallic products. Incorporators, Emil Christiansen, George C. Bunge and H. J. Pickering.

Metallic Sales Corporation, 17 North Wabash avenue. Capital, $10,000; deal in silverware, novelties, metals, metallic merchandise. Incorporators, Richard M. Peare, Howard E. Faulkner and Harold E. Morris.

The **Atlas Can Company,** Geneva, manufacture and deal in tin cans and metal receptacles. Incorporators, P. J. McGarrshan, F. A. Lennie and Carl W. Schaefer.

Atwell Manufacturing Company, 2723-25 Prindiville avenue. Capital, $100,000 and 4,000 shares non par value; manufacture and deal in wood, metal and electrical specialties. Incorporators, Thomas C. Arndt, Harry R. Mills and Louis K. Schwall.

Excel Pattern & Foundry Company, 2057 West Van Buren street. Capital, $15,000; manufacture and deal in wood and metal patterns. Incorporators, William Elsner, George Grassmeyer and P. J. Murphy.

Sheets Rockford Silver Company, 1008 Mulberry street, Rockford. Capital, $50,000; general manufacturing business, including manufacture of all kinds of silverware. Incorporators, R. W. Sheets, C. W. Hammond and Charles D. Bowden.

Naylor Spiral Pipe Company, 1230 East Ninety-second street. Capital, $250,000 and 2,500 shares non par value; manufacture and generally deal in machinery, pipe metal products and other merchandise. Incorporators, John J. Miller, Alexander Henderson, F. L. Naylor, C. G. Naylor and E. M. Naylor.

Maxwell Radio Corporation, 108 South La Salle street. Capital, $40,000; manufacture and deal in radio sets, equipment and supplies. Incorporators, A. P. Kottler and S. R. Maxwell.

Cribben Radio Corporation, 600 West Washington street. Capital, $10,000; manufacture and deal in radios and equipment. Incorporators, Robert E. Rohn, William W. Harper and Robert H. Cribben.

Moore Radio Products, 337 West Madison street. Capital, $10,000; manufacture and sale of radio apparatus and electrical equipment. Incorporators, E. W. Pottle, V. C. Johnson and William B. Gilmore.—L. H. G.

Business Items Verified

Handy & Harman are moving their New York plant from 29 Gold street to corner of Fulton & Gold streets, New York.

Mefford Chemical Company announces the removal to their own new building at 1026 Santa Fe avenue, Los Angeles, Cal.

George Murad has moved from 57 Grand street to 351 Canal street, New York City. He makes a specialty of white metal castings and mold making.

J. A. Perilli and **W. A. Tait** have established the **National Plating Laboratories** at 416 East 23rd street, New York City, for the electro-plating of record matrices.

The **United States Plating Works** have taken the shop at 414 West Broadway, New York City. They do job plating in all metals and make a specialty of plating die castings.

A small fire occured at the plant of **Moynahan & Duchene,**

Inc., 2658 Porter street, Detroit, Mich., in January. The plant has been repaired and is now operating. This firm manufactures brass, bronze and other metal products.

Superior Nonferrous Foundry Company, South Bend, Ind., has been incorporated to conduct a brass, bronze and aluminum foundry business by Clarence C. Walters, Hope P. Walters and Anna I. E. Walters, all of 601 East Dayton street, South Bend.

The **National Lead Battery Company,** 1703-25 Roblyn avenue, St. Paul, Minn., is said to be contemplating the construction of a new plant at Los Angeles, for automobile and radio service. **L. J. Shields** is president. This firm operates a casting shop.

The **Leeds & Northrup Company,** 4901 Stenton avenue, Philadelphia, Pa., manufacturer of electrical measuring instruments, has asked bids on a general contract for a factory addition to cost $60,000. Morris & Erskine, 1716 Cherry street, are architects.

Hisey-Wolf Machine Company, Cincinnati, Ohio, announces a reduction of prices of its electric tools. Electric drills of the most popular sizes have been reduced from 12½ per cent to 17 per cent, and many other price reductions from 5 per cent to 10 per cent have been made.

Waukegan Chemical Company, manufacturer of Brevolite lacquers and enamels, has moved to a larger plant in North Chicago, Ill. The new plant is located on Sheridan road, the main highway from Chicago to Milwaukee, and includes a switchtrack and other increased facilities.

With the opening of a district sales office at 160 N. La Salle street, Chicago, the **American Cable Company** announces the appointment of **W. H. Slingluff** to handle sales of the company's Tru-lay wire rope, Tru-loc fittings and other standard wire rope products in the midwestern states.

The **Yost Manufacturing Company**, Meadville, Pa., manufacturer of vises, anvils and gas soldering furnaces, has opened a Chicago office and warehouse at 25 South Jefferson street, with **H. S. Huncke** in charge. This firm operates the following departments: tool room, grinding room, casting shop.

The **Standard-Peninsular Brass Works**, West Warren and Walton avenues, Detroit, Mich., are planning to erect a foundry and an office building. **H. R. Brownell** is president. This firm operates the following departments: brass foundry, brass machine shop, tool room, grinding room, plating, polishing.

The recently organizel **Missouri Lead Products Company,** 2437 Jefferson street, Kansas City, Mo., has completed the construction of a plant and is turning out antimonial lead, babbitt, slab zinc, etc., and carries a stock of pig tin, lead and antimony. This firm operates a smelting and refining plant.

Nichols Copper Company, New York, has arranged group insurance program providing generous protection for its employees, established on a co-operative basis, and underwritten by the **Metropolitan Life Insurance Company,** of New York. The plan covers more than 600 employees for insurance exceeding $1,000,000.

The capital stock of the **Allied Industrial Products Company,** Chicago, Ill., was increased from $30,000 to $75,000, all of which is held by the following officers: **C. J. Cahill,** president; **J. J. Lawler,** vice-president; **R. W. Conlin,** secretary-treasurer. The company manufactures metal cleaners and deals in platers' supplies and pumice stone.

The **Standard Plating Works,** Goshen, Ind., recently suffered a loss of $1,800 caused by fire, destroying part of its plant and equipment. The firm would like to get a used 1,500 ampere generator, 3 bus bars and a Tolhurst centrifugal dryer. The following departments are operated: grinding room, galvanizing, plating, japanning, stamping, polishing, lacquering.

Roessler & Hasslacher Chemical Company, New York, announces the production of Tri-chlorethylene and Tetrachlorethane. This is an entirely new development in this country, although this company has been importing these items for several years. The value of these commodities in the metal industry is enhanced by the fact that they are non-inflammable.

The **Electrical Water Purifier Company,** 402 Republic Bank building, Dallas, Texas, organized to manufacture as indicated, has contracted temporarily for most of the operations, but is in the market for zinc, aluminum, electrical parts and other materials. It is interested in negotiating with shops equipped to manufacture this line. **R. M. Holden** is vice-president and general manager.

Coincident with the establishing of a welding service department to handle welding rod problems for customers, the **Page Steel & Wire Company** announces the appointment of **J. J. Flaherty** to direct sales of Armco, high carbon and low carbon welding rod wire. Mr. Flaherty, who was formerly in charge of welding for the Boston Elevated Railways, will have headquarters at Bridgeport, Conn.

The **Joslyn Manufacturing & Supply Company,** 133 West Washington street, Chicago, Ill., will construct a one-story galvanizing plant, 130 x 230 ft., at 1021-29 W. 39th street, to cost $125,000. This company's business is electric transmission line supplies, including pole line hardware in every detail. The following departments are operated: tool room, grinding room, cutting-up shop, galvanizing, rolling mill, stamping.

The **Ely Anode & Supply Company, Inc.,** New York City, and New Haven, Conn., announces the recent acquisition of new and more modern equipment. These facilities will be used to manufacture a full line of anodes. Up to this time the company has made only nickel anodes but will now manufacture nickel, brass, copper and zinc anodes, and will continue to carry a full line of plating and polishing supplies and equipment.

Bids are being received on a general contract by the **Shulte Brass Manufacturing Company,** Norwood, Ohio, manufacturer of plumbers' supplies, for a new plant 50 x 300 ft. Requirements will include equipment for a brass foundry, machine shop and finishing works. **George T. Shulte** heads the company. This firm operates the following departments: aluminum, brass and bronze foundry; brass machine shop, tool room, plating, polishing.

Roberts Brass Company, 178 Lincoln avenue, Milwaukee, Wis., will build a two-story brick and mill foundry and machine shop addition, 70 x 110ft., and has let the contract to the Hercules Construction Company, 211 Grand avenue, local. The extension will have a part basement for a heating plant. This firm operates the following departments: aluminum foundry, brass machine shop, tool room, grinding room, casting shop, brazing, plating, stamping, soldering, polishing.

The **La Grange Iron Works,** La Grange, Ga., has purchased the **J. T. Tice Company,** of that city, and is operating the business on a normal basis. The La Grange Works manufacture brass and aluminum castings, specializing in grey iron castings of all kinds, ranging from 1 oz. to 1 ton. They also deal in various iron and steel products. They are interested in purchasing a few additional machine tools. This firm operates the following departments: brass, bronze and aluminum foundry; brass machine shop, grinding room, casting shop.

The **Ajax-Electrothermic Corporation,** Trenton, N. J., announces the recent sale of 1-35 kv-a. Ajax-Northrup high frequency converted with small high frequency induction furnaces to each of the following institutions: Bureau of Standards, Washington, D. C. (their fourth unit); General Electric Company, West Lynn, Mass. (their fourth unit); Vanadium Corporation of America, Bridgeville, Pa.; The Thermal Syndicate, Ltd., Neptune Works, Wallsend-on-Tyne; H. M. Post Office Research Station, Dollis Hill, London. The last two units mentioned are being manufactured in England by this company's representatives and licensees, The Electric Furnace Company, Ltd., of London. During the past year this company has supplied 18-35 kv-a. Ajax-Northrup high frequency converter units to the Gutta Percha Company, Ltd.

DISSTON SAFETY CAMPAIGN

An Annual Safety Meeting to celebrate the results of the 1924 Safety Campaign was held at the Philadelphia plant of Henry Disston & Sons, Inc. Conspicuous by their attendance and active participation were the officials of the Company.

Some interesting figures were presented by A. N. Blum, Chief Engineer, and chairman of the general safety committee who organized the safety committee nine years ago, and who has been in charg of the campaign since that time. He showed that in 1916, with a smaller working force, a total of 5471 working days were lost as the result of about 300 men being injured due to accidents. This was an average loss of 18 days per accident.

In the year just concluded, after nine years of safety campaign, men suffered an accident causing loss of one or more days' time, and but 1174 working days were lost through accidents, with the average days lost per accident reduced to less than 17. "Safety First" methods, resulting in prompt treatment of all injuries, however slight, contribute their share of these improved results.

In addition to the regular safety work, a very attractive insurance schedule has been worked out for employes of the Disston business. The policy offered is a combination accident, sick-benefit, and life insurance, written through one of the standard insurance companies which has specialized in industrial insurance.

The Disston executives look upon their campaign for safety as necessary and profitable to the men and to the company.

NICKEL COMPANY SALE

The auction sale of the properties of the British America Nickel Corporation, Ltd., conducted recently by Charles Garrow, K. C., Master of the Supreme Court of Ontario, proved abortive. Only one bid, for $5,000,00, was made and the master stated it did not reach the upset price which had been fixed by the court. The court authorized National Trust Company, Ltd., the receivers, to conduct negotiations for a private sale of the properties and to submit offers to the court on or before May 7, 1925. Since the receivership commenced the receivers have obtained a valuable option from the Wahnipitae Power Company on the new development made by said company. This option is being sold with the assets of the Nickel Corporation so that the purchaser will obtain the benefit of it. The evidence submitted to the Court some weeks ago for the purpose of fixing the upset price showed that approximately $15,000,000 in cash and the equivalent in mortgaged securities of $5,000,000, making in all $20,000,000, had been expended on capital account in connection with the acquisition and development of the properties entirely apart from the $20,000,000 of common stock, which was issued largely for the acquisition of the mining properties and the rights to the electrolytic process which is used in the refining of nickel and copper ores. An important feature of the process is the high recoveries of precious metals which it permits. The ores of the British America Nickel Corporation contain important quantities of platinum, palladium and kindred metals.

AMERICAN PEWTER EXHIBIT

In Boston, Mass, Feb. 7, 1925, was held at The Twentieth Century Club on Joy Street, a unique exhibition, the first of American pewter ever given in the United States. There were some 500 pieces, coming from collectors and museums, and each piece was marked.

Many of the exhibitors sent pewter made by their ancestors, sometimes of the same name. Charles A. Calder, of Providence, a well-known collector of that city, sent many beautiful pieces of pewter made by his ancestor, an old-time Providence pewterer, William Calder. John Whiting Webber, who is a great-grandson of Oliver Trask, pewterer, of Beverly, and, who was Chairman of the Advisory committee of the exhibition, sent many pieces by Israel and Oliver Trask.

The largest collection of pewter was sent by John Barrett Kerfoot, of Freehold, N. J., the authority on American pewter, who has just brought out a large and important book on the subject. An interesting feature of Mr. Kerfoot's collection was a set of sixty-eight inch pewter plates, made by different American pewterers, including every one so far known. It was the eight-inch pewter plate which succeeded the wooden table ware in this country and was used on the family table after 1800. Mr. Kerfoot's plates were arranged on a long table, the backs up, so that the marks could be seen.

$100,000 EXPENDITURE SAVES $600,000,000

Secretary Hoover told the American Engineering Council in Washington, D. C., January 17, 1925, that although the Department of Commerce had spent only $100,000 a year in its campaign to promote in industry methods which would eliminate wasteful practices, reforms brought about had resulted in a reduction in waste in excess of $600,000,000 annually. The money available to the Department of Commerce to carry on its fight against wasteful practices in industry was limited, but the department had brought about cooperation from industry which had gone far to increase efficiency.

"It is a curious fact that were it possible under our form of government to recruit money by public subscription for the expense and continuation of that work, there would be no difficulty in raising that sum, or from $1,000,000 to $5,000,000 per annum from the trades themselves, so much do they appreciate the possibility of a Government service of a reproductive character.

"I am not asking the Director of the Budget to increase our appropriation to $5,000,000 or $1,000,000 a year. Perhaps when I go to him I may only ask for $25,000, but I do suggest that the time is rapidly approaching when a review of the real productive services of the Government, a review in the interest of the American people themselves, will result in a more liberal treatment of all those branches."

CLEANING AND LUBRICATING CONFERENCE

At the Hotel McAlpin in New York City recently, the International Chemical Company of Philadelphia held one of its quarterly, sectional Idea Conferences. Representatives from New England, New York, and the home office attended, and the difficult cleaning and lubricating problems met in various plants were thoroughly discussed from an engineering and chemical standpoint.

Some of the interesting things brought out were a thorough explanation of the new International Method of cleaning fuel oil tanks with the subsequent handling of the sludge removed. Many successful tests with the several new International materials that have been perfected for cleaning die castings and aluminum without tarnishing the metal were reported on at great length by the various men. The newly developed japan stripper which removes all traces of japan in minutes where former materials took hours also came in for its share of discussion.

This conference was really a clearing house for ideas, and after a good fellowship dinner the men departed for the various territories, all with their own knowledge and technical training augmented by the ideas of all the other men.

ALUMINUM IN 1924

The new aluminum produced in the United States in 1924 had a value of $37,607,000, which is an increase of almost one-third over the value of the output in 1923, according to a statement issued by the Department of the Interior, prepared by James M. Hill, of the Geological Survey. The domestic demand for aluminum, much of it for automobile parts, was somewhat less in 1924 than in 1923, as the production of automobiles was smaller and some manufacturers are now using pressed steel instead of the high priced aluminum.

The imports of aluminum in 1924 were nearly one-third less than in 1923, whereas the exports in 1924 increased 25 per cent over those in 1923. The total imports in 1924 amounted to 30,588,525 pounds, which comprised 29,394,155 pounds of crude metal from scrap and alloy, 790,130 pounds of manufactured plates, sheets and bars, and 404,240 pounds of hollow ware. The total exports amounted to 13,126,752 pounds, which comprised 3,356,786 pounds of ingot, scrap and alloys, 2,986,726 pounds of plate, sheets, bars, strips and rods, 3,574,427 pounds of tubes, moldings, castings and other shapes, 1,026,593 pounds of table, kitchen and hospital utensils, and 2,182,220 pounds of all other manufacturers.

CENSUS OF CHEMICALS

The Department of Commerce announces that, according to the data collected at the biennial census of manufactures, 1923, the establishments engaged primarily in the manufacture of chemicals, other than sulphuric, nitric, and mixed acids, explosives, fertilizers, and wood-distillation products, reported a total output valued at $630,493,969, an increase of 61.3 per cent as compared with $390,768,434 in 1921, the last preceding census year, and of 9.8 per

cent as compared with $574,141,030 in 1919. In addition, establishments whose principal products were sulphuric, nitric, and mixed acids reported, for 1923, a combined output valued at $24,404,580, and subsidiary chemical products to the value of $37,596,338 were manufactured by establishments in other industries, making an aggregate of $692,494,887, comprising chemicals to the value of $675,797,974 and by-products, residues, and amounts received for contract work, $16,696,913.

The value of chemicals produced by the aid of electricity amounted in 1923 to $105,357,452, or 15.6 per cent of the total value of chemicals produced, and in 1921 to $57,979,720, or 13.1 per cent. Rare metals and alloys amounted to $3,035,302 against $1,289,430 for 1921, an increase of 110.6%. Other metals amounted to $29,924,140 against $12,196,995 in 1921, an increase of 145.3%.

COPPER PROSPECT GOOD, SAYS RYAN

John D. Ryan, chairman of the board of directors of the Anaconda Copper Mining Company, looks for a continuation of good business for the copper companies. He said the recent decline reaction was not confined to copper, but generally in the commodity markets.

"Shipments of refined copper by producers of fabricators during the first quarter of 1925 have been unusually good," according to Mr. Ryan. "Apparently shipments of finished brass and copper goods by fabricators to ultimate consumers also have been unusually large. Judging from the Anaconda rod and wire mills at Great Falls, Mont., and the American Brass Company, they have been record-breaking.

"Shipments of finished brass and copper products by Anaconda and American Brass mills during the first quarter amounted to 200,000,000 pounds, or at the rate of 800,000,000 pounds of metal annually.

"While we do not give out the poundage of new orders for fabricated and finished metals, I will say that bookings during the first quarter of 1925, even with the decline shown toward the end of the quarter, were almost as large as for any three months in the history of the company."—NEW YORK TIMES.

FEDERATED METALS REPORT

The Federated Metals Corporation, New York, in its initial financial statement, reports earnings of $3.30 a share for the seven months ended Dec. 31, 1924, on its 249,712 no par value shares. Gross sales for the seven months' period were $21,000,000 and gross profits $2,286,415. Net profit, after depreciation, was $1,110,813, and the balance before bond interest $1,084,034. According to the balance sheet the company had a working capital of $8,900,000 on Dec. 31, of which $1,630,500 was in cash.—NEW YORK TIMES.

$600,000 IN COPPER RECOVERED

Divers have recovered a $600,000 cargo of copper lost since 1869, when the British frigate Cape Horn was wrecked off the coast of Chile, according to messages received by the Westinghouse Lamp Company, Newark, N. J., from Captain Benjamin Leavitt of the salvage ship Blakely. With the success of this expedition, Captain Leavitt will soon try to salvage the treasure in the Lusitania. Divers worked in high-pressure diving suits of Captain Leavitt's invention equipped with special pressure resisting deep-sea lamps made by the Westinghouse Company, which made it possible for the divers to see plainly while more than 200 feet below the surface of the sea.

FORDS INTERESTED IN METAL PLANES

Henry and Edsel Ford are not engaged in the manufacture of airplanes, but they are both keenly interested in the development of aviation and the future of Detroit as the centre of the aircraft industry.

"While we are not actually engaged in the manufacture of airplanes," said Edsel Ford, "we are financially interested in the Stout Metal Airplane Company and the Aircraft Development Corporation, which will soon place the first metal-clad lighter-than-air ship in the air, with Detroit as its home.—NEW YORK TIMES.

METAL 2500 YEARS OLD

In excavating in Utica, Tunis, the investigators dug up what seems to have been a child's savings bank with six bronze coins. Also chunks of molten metal were found, closely resembling coal clinkers. They are being studied to learn if furnaces were used at that time to smelt ores.

NATIONAL CASH REGISTER BONUS

The National Cash Register Company of Dayton, Ohio, has paid to its employees, as a bonus for 1924, a total of $1,490,711.26. F. B. Patterson, president, stated that "profit-sharing makes employees realize that they are partners in the business; and this results in reduced labor turnover, closer co-operation, increased production, decreased waste of material, time and labor, and other benefits. If universally adopted I believe it would go, perhaps, farther than anything else to bridge the gap between capital and labor."

GERMAN CONSUMPTION OF METALS

According to Trade Commissioner W. T. Daugherty, Berlin, January 22, 1925, Germany's imports of metals in the first 11 months of 1924 indicate that industrial consumption was somewhat greater than in 1923, but, according to estimates, only about one-third of the pre-war figure. One exception is aluminum, of which one-third more was consumed than in 1913. Its uses have been extended, and, since the war, a flourishing industry has been developed. At present, Germany is potentially independent of foreign imports of the raw aluminum, if not of the bauxite from which it is prepared.

FRENCH 1924 TRADE IN METALS

The outstanding features of the foreign nonferrous metals trade of France in 1924, as compared with 1923, were a strong increase in the tonnage import and a moderate decrease in exports. Similar, but less marked, movements occurred in the imports and exports of nonferrous ores, with the exception of shipments of bauxite, the dominant item in this group, which registered a slight increase.—COMMERCE REPORTS.

AUSTRIAN ALUMINUM COMPETITION

According to the Department of Commerce, Washington, D. C., the Austrian aluminum industry reports that cut-throat German competition is hurting its trade, not only in the domestic market, but also in the Austrian export markets. German aluminum wares were said to have been offered at the costs of the metal. Swiss competition is also present.

METAL STOCK MARKET QUOTATIONS

	Par	Bid	Asked
Aluminum Company of America...	$100	$490	$520
American Hardware Corporation...	100	82	86
Anaconda Copper	50	37⅝	37¾
Bristol Brass	25	8	12
International Nickel, com.....	25	26⅛	26¼
International Nickel, pfd.....	100	98	98½
International Silver, com.....	100	140	145
International Silver, pfd.....	100	108	112
National Enameling & Stamping...	100	31¾	33
National Lead Company, com.....	100	145½	147
National Lead Company, pfd.....	100	116	117½
New Jersey Zinc.....	100	183½	186
Rome Brass & Copper.....	100	140	155
Scovill Manufacturing Company...	..	235	240
Yale & Towne Mfg. Company, new	..	64	66

Corrected by J. K. Rice, Jr., Co., 36 Wall street, New York.

PAPER INDUSTRY USES COPPER

More than 8,000,000 pounds of copper are consumed yearly by the pulp and paper industries, according to a report of the Copper and Brass Research Association. The copper is used principally in alloy form for bronze and brass wire and pulp screens, bronze castings, bar stock, sheet and rod brass, brass tubing and brass and bronze rollers.

Review of the Wrought Metal Business

Written for The Metal Industry by J. J. WHITEHEAD, President of the Whitehead Metal Products Company of New York, Inc.

April 1, 1925.

The unsatisfactory condition in the metal industry reported during February has continued through March, and as the month closes several further declines in the price of brass and copper rod, sheet, tube and wire have been put into effect. The primary cause of these declines is, of course, the lower prices quoted for copper, lead and zinc, although this does not hold true of all reductions, since some products were reduced in price to a much greater extent than others, especially with reference to the new prices quoted on brass rod which mark a reduction entirely out of proportion to any decline in the price of the basic material. The heavy cut in brass rod prices can be ascribed only to the fact that some mills were making quotations so far out of line with the published prices that a readjustment of the published prices was considered to be necessary.

Business during the past sixty days has been decidedly spotty and some of the mills have made an effort to bolster up their tonnage by making price inducements, with the result that a more or less demoralized condition has developed. Some of the mills have reported that on each decline they have booked very heavy tonnages, and that their order book is in a very satisfactory condition. Others are complaining that there is not enough business being placed to provide them with tonnage beyond a week to week operation.

Taking the situation as a whole, however, it must be noted that there are large orders for various products being placed, and that some of the mills are getting a very good proportion of the total business and sitting fairly comfortably, and the others who are complaining of poor business admit that they are running on full time. There seems to be a good deal of psychology working through the whole situation as is freely admitted by all who are willing to discuss the matter frankly, that the volume of tonnage which is being placed is far in excess of the average volume which has been available during the past year or two.

It is again to be noted that the branch embracing nickel and its alloys, Monel metal and nickel silver continues to be very active and strong. The steady growth of the demand for white metals, having nickel as a base, has been one of the remarkable features during the past year and a half. Educational campaigns carried on by the manufacturers of these metals have been the means of broadcasting information as to how they can be worked up into various articles for commercial use. Their steady growth in consumption has kept this branch in a very satisfactory condition during all the time in which the copper and brass industry has been subject to irregularities of a very disheartening character.

One new development in the brass and copper industry that is attracting some attention is the adoption, by one of the mills in this country, of a process for coating sheet copper with tin to a depth greatly in excess of anything that has heretofore been done in this country. This is an adaptation of a process which has developed in Europe which makes it possible to coat copper sheet with tin to any desired depth. Sheets are now being produced by this super-tinning process which carry from three to five times as much tin as is carried on the regular tinned sheets now manufactured in this country.

Metal Market Review

Written for The Metal Industry by METAL MAN

COPPER

April 1, 1925.

March conditions in the copper market showed a sagging tendency in prices most of the month. Sales were made in moderate volume from time to time at declining levels. Frequent concessions, however, created an unsettled feeling and tended to make buyers specially conservative in placing new orders.

The present high state of production was largely responsible for the introduction of weakness in the situation. Recently there has been more pressure to sell in both the domestic and foreign markets on a downward scale. Offerings were more freely made. Prices suffered in consequence, and home consumers were inclined to defer placing important orders until the market became more settled. Electrolytic sold at 13½ cents delivered to moderate extent. Buyers cautious in view of existing market depression.

ZINC

The market for zinc shared the depression which extended to all the non-ferrous metals recently. Considerable unsettlement occured owing to the weakness prevailing abroad. Some sales were reported at 7.05, East St. Louis. This is the lowest price for several months. In spite of the easier prices now quoted buyers are reserved. Demand is consequently light. Offers of Joplin ore are more liberal and sellers find it more difficult to effect satisfactory sales. The New York delivery price is quoted at 7.40@7.45 cents, and compared with 7.60 cents at beginning of March.

TIN

The tin market has been a decided disappointment to those who have entertained an optimistic opinion regarding this commodity. The statistical position seems to be strong enough, but there appear to be various cross currents operating to make consumers suspicious of any attempt to advance prices. There was a drastic decline in London quotations during March. Weakness was pronounced at the month end, and the total recession in the last three days of the month amounted to £11 15s. per ton. Domestic consumption during the first quarter of the year was maintained on a good scale. There is no good argument for inflated prices, however, and wherever manipulation succeeds in lifting prices above 50 cents a pound consumers will do wisely to cut down their buying to actual requirements.

Deliveries of tin in United States for first two months of this year were 14,360 tons, against 13,740 tons for first two months of last year. Statistics for March are not ready as we close our report. Good deliveries and a probable reduction in visible supplies are anticipated.

LEAD

There was fairly good buying of lead in March, but the downward trend of prices in the foreign market depressed the domestic situation and caused a decline to 8½ cents in the local trade. The American Smelting & Refining Company made three reductions in March. Foreign weakness has been conspicuous for some time past, and its influence on buyers here made for caution in placing new orders. The East St. Louis price is down to 8⅛ cents or a shade below. Lead at current quotations still is abnormally high, being more than twice as high as the average price at New York in 1914 and 3.95 cents higher than the average price in 1921. Domestic consumption is large, but production is on the increase and supplies appear ample. The National Lead Company carries a stock reported to be equal to 96,000 tons of lead, and this stock is maintained by fresh purchases when necessary.

ALUMINUM

Prices of aluminum keep up remarkably steady on the basis of 28 cents for 99 per cent virgin metal and 27 cents for

98-99 per cent material. Demand is fair which enables sellers to move stock at full prices. There appears to be a sound condition underlying the market. Supplies are moving into consumption at a good rate, and no unhealthy accumulation appears to be allowed as a disturbing business factor. Importers are well sold and under no necessity to hunt up new business of special importance.

ANTIMONY

Lower prices for antimony have developed lately. Quotations for Chinese **regulus** 99 per cent assay are down to 12¾@13 cents for March-April shipment from China. Prompt delivery quotes 14 cents duty paid. Demand is quiet and confined to moderate quantities. China shippers have modified their views and are open for business on more reasonable terms. Consumers are not very actively interested but a better demand is looked for soon.

QUICKSILVER

There has been a distinct market recovery in quicksilver within recent weeks. Offers are quite restricted and for whatever is obtainable sellers want $83.50@$84 per flask. Spot supplies are scarce, but shipments are on the way. It is said, however, that the expected arrivals have been sold for most part.

PLATINUM

Business in platinum is quietly effected at about $118 per ounce for the refined metal. Total world output of platinum in 1924 was estimated at around 88,000 ounces, against Russia output of 250,000 ounces in 1913. United States demand is greater than all other countries combined, according to reliable authorities. Increase in new supplies is expected to be rather slow and gradual.

SILVER

Silver prices have been moving within a narrow range lately. Recent price in New York market was 67⅜ cents per ounce. An advancing market is not expected until purchases for India and China, as well as for silver currency requirements in Europe, increase. India has been a recent factor in maintaining prices where they are. The prosperity of that country is a boon to silver producers. Stocks in China are large, and conditions have not been favorable enough to create a Chinese demand of pronounced importance. Silver production of North America and Peru in February was estimated at 15,145,003 ounces, as compared with 15,774,488 ounces in January, and 16,239,106 ounces in December.

OLD METALS

Lower prices have been forced upon scrap dealers owing to the drastic declines in virgin metals. The unsettled condition in copper, lead and zinc has called for price revisions in scrap quotations. The lower values may prove attractive to consumers as there appears to be a good export outlet for several of the scrap metals. Melters are using old lead and copper in good volume, and buyers are sure to become actively interested as soon as the primary markets improve. Closing prices at end of March quote 11@11.25 cents for heavy copper, 9@9¼ cents for light copper, 6½@6¾ cents for heavy brass, 5½@5¾ cents for light brass, 6½@6¾ cents for heavy lead, 4 cents for old zinc scrap, and 21½@22 cents for aluminum clippings.

WATERBURY AVERAGE

Lake Copper—Average for 1924, 13,419—January, 1925, 15.125—February, 15.00—March, 14.375.

Brass Mill Zinc—Average for 1924, 7.10—January, 1925, 8.60—February, 8.00—March, 8.10.

Daily Metal Prices for the Month of March, 1925

Record of Daily, Highest, Lowest and Average

	2	3	4	5	6	9	10	11	12	13	16	17	18
Copper (f. o. b. Ref.) c/lb. Duty Free.....													
Lake (Delivered)	14.625	14.625	14.625	14.75	14.75	14.75	14.625	14.625	14.625	14.625	14.625	14.50	14.50
Electrolytic	14.40	14.45	14.50	14.60	14.55	14.50	14.40	14.40	14.35	14.35	14.35	14.25	14.20
Casting	14.00	14.00	14.125	14.125	14.125	14.125	14.00	14.00	13.875	13.875	13.875	13.75	13.75
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb.....													
Prime Western	7.25	7.375	7.45	7.50	7.50	7.50	7.35	7.30	7.40	7.45	7.425	7.35	7.30
Brass Special	7.375	7.45	7.50	7.525	7.525	7.55	7.45	7.40	7.50	7.50	7.50	7.45	7.40
Tin (f. o. b. N. Y.) c/lb. Duty Free.....													
Straits	54.625	55.00	55.25	54.625	53.875	53.50	53.375	53.375	54.125	54.50	53.375	53.00	52.875
Pig 99%	54.00	54.375	54.50	54.00	53.125	52.75	52.625	52.625	53.375	53.75	52.625	52.25	52.125
Lead (f. o. b. St. L.) c/lb. Duty 2½c/lb.....	8.825	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.70	8.70	8.675	8.65
Aluminum c/lb. Duty 5c/lb.	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00
Nickel c/lb. Duty 3c/lb.													
Ingot	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00
Shot	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00
Electrolytic	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00
Antimony (J. & Ch.) c/lb. Duty 2c/lb.....	17.75	17.50	17.00	17.00	16.50	16.50	16.50	16.50	16.00	16.00	15.75	15.25	15.25
Silver c/oz. Troy Duty Free	68.25	68.25	68.25	68.125	68.00	68.25	68.125	68.125	67.875	68.00	68.00	68.125	68.00
Platinum $/oz. Troy Duty Free	118	118	118	118	118	118	118	118	118	118	118	118	118

	19	20	23	24	25	26	27	30	31	High	Low	Aver.
Copper (f. o. b. Ref.) c/lb. Duty Free.....												
Lake (Delivered)	14.375	14.375	14.375	14.375	14.375	14.25	14.125	13.75	13.75	14.75	13.75	14.455
Electrolytic	14.15	14.25	14.25	14.25	14.00	13.95	13.75	13.50	13.45	14.60	13.45	14.220
Casting	13.70	13.75	13.75	13.75	13.625	13.625	13.50	13.25	13.25	14.125	13.25	13.810
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb.....												
Prime Western	7.30	7.35	7.40	7.35	7.35	7.35	7.25	7.10	7.00	7.50	7.00	7.345
Brass Special	7.40	7.45	7.50	7.45	7.45	7.45	7.375	7.30	7.10	7.55	7.10	7.432
Tin (f. o. b. N. Y.) c/lb. Duty Free.....												
Straits	53.125	54.25	53.25	53.625	53.875	54.25	53.375	52.125	52.375	55.25	52.125	53.716
Pig 99%	52.375	53.50	52.50	52.875	52.875	53.375	52.625	51.375	51.625	54.50	51.375	52.966
Lead (f. o. b. St. L.) c/lb. Duty 2½c/lb.....	8.60	8.60	8.60	8.55	8.55	8.45	8.35	8.125	8.10	8.825	8.10	8.613
Aluminum c/lb. Duty 5c/lb.	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00
Nickel c/lb. Duty 3c/lb.												
Ingot	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00
Shot	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00
Electrolytic	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00
Antimony (J. & Ch.) c/lb. Duty 2c/lb.....	15.00	14.50	14.50	14.25	14.00	14.00	14.00	14.00	14.00	17.75	14.00	15.534
Silver c/oz. Troy Duty Free	68.00	67.75	67.625	67.125	67.125	67.375	67.25	67.375	67.125	68.25	67.125	57.824
Platinum $/oz. Troy Duty Free	118	118	118	118	118	118	118	118	118	118	118	118

Metal Prices, April 6, 1925

Copper: Lake, 13.75. Electrolytic, 13.45. Casting, 13.25.
Zinc: Prime Western, 7.10. Brass Special, 7.20.
Tin: Straits, 50.50. Pig, 99%, 49.875.
Lead: 7.95. **Aluminum,** 28.00. **Antimony,** 13.90.
Nickel: Ingot, 31.00. Shot, 32.00. Electrolytic, International Nickel Company, 38.00.
Quicksilver, flask, 75 lbs., $84.50. **Silver,** oz. Troy, 67.125.
Platinum, oz. Troy, $118. **Gold,** or. Troy, $20.67.

Metal Prices, April 6, 1925

INGOT METALS AND ALLOYS

Brass Ingots, Yellow	10½to12
Brass Ingots, Red	11¼to13
Bronze Ingots	12 to13
Bismuth	$1.95
Cadmium	50 to60
Casting Aluminum Alloys	21 to24
Cobalt—97% pure	$2.50to$2.75
Manganese Bronze Castings	23 to40
Manganese Bronze Ingots	13 to16½
Manganese Bronze Forging	34 to44
Manganese Copper, 30%	28 to45
Parsons Manganese Bronze Ingots	18¼to19¾
Phosphor Bronze	24 to30
Phosphor Copper, guaranteed 15%	18½to21
Phosphor Copper, guaranteed 10%	18 to20
Phosphor Tin, guaranteed 5%	65 to70
Phosphor Tin, no guarantee	59 to70
Silicon Copper, 10% ....according to quantity	28 to35

OLD METALS

Buying Prices		Selling Prices
12¼to12½	Heavy Cut Copper	13¼to13¾
12 to12¼	Copper Wire	13 to13½
10¼to10½	Light Copper	11½to12
9¼to 9½	Heavy Machine Comp	10¾to11¼
7¾to 8	Heavy Brass	8¾to 9¼
6¾to 7	Light Brass	8 to 8¼
8¼to 8¾	No. 1 Yellow Brass Turnings	9¾to10
8½to 9	No. 1 Comp. Turnings	10 to10½
8 to 8¼	Heavy Lead	8¾to 9
4¾to 5	Zinc Scrap	5¾to 6
10	Scrap Aluminum Turnings	12 to14
16 to17	Scrap Aluminum, cast alloyed	18 to19
20	Scrap Aluminum, sheet (new)	23 to25
32	No. 1 Pewter	36 to38
12	Old Nickel anodes	14
18	Old Nickel	20

BRASS MATERIAL—MILL SHIPMENTS

In effect Mar. 30, 1925

To customers who buy 5,000 lbs. or more in one order.

	Net base per lb. High Brass	Low Brass	Bronze
Sheet	$0.18⅛	$0.19⅞	$0.21⅞
Wire	.18⅝	.20⅜	.22⅜
Rod	.15⅞	.20⅝	.22⅝
Brazed tubing	.26½	.....	.31⅝
Open seam tubing	.26½	.....	.31⅝
Angles and channels	.29⅛	.....	.34⅝

To customers who buy less than 5,000 lbs. in one order.

	Net base per lb. High Brass	Low Brass	Bronze
Sheet	$0.19⅛	$0.20⅞	$0.22⅞
Wire	.19⅝	.21⅜	.23⅜
Rod	.16⅞	.21⅝	.23⅝
Brazed tubing	.27⅛	.....	.32⅝
Open seam tubing	.27⅛	.....	.32⅝
Angles and channels	.30⅛	.....	.35⅝

SEAMLESS TUBING

Brass, 22¾c. to 23¾c.
Copper, 23¾c. to 24¾c.

TOBIN BRONZE AND MUNTZ METAL

Tobin Bronze Rod	20⅛c. net base
Muntz or Yellow Metal Sheathing (14"x48")	18⅛c. net base
Muntz or Yellow Rectangular sheet other Sheathing	19⅛c. net base
Muntz or Yellow Metal Rod	16⅛c. net base

Above are for 100 lbs. or more in one order.

COPPER SHEET

Mill shipments (hot rolled)	20¾c. to 23¼c. net base
From stock	21¾c. to 23¾c. net base

BARE COPPER WIRE—CARLOAD LOTS

16⅛c. to 16¼c. net base.

SOLDERING COPPERS

300 lbs. and over in one order	20⅝c. net base
100 lbs. to 200 lbs. in one order	21⅛c. net base

ZINC SHEET

Duty, sheet, 15%	Cents per lb.
Carload lots, standard sizes and gauges, at mill, less 8 per cent discount	10.25 basis
Casks, jobbers' price	11.50 net base
Open Casks, jobbers' price	12.00 to 12.25 net base

ALUMINUM SHEET AND COIL

Aluminum sheet, 18 ga., base price	40c.
Aluminum coils, 24 ga., base price	36.70c.
Foreign	40c.

NICKEL SILVER (NICKELENE)

Net Base Prices

Grade "A" Nickel Silver Sheet Metal

10%	Quality	25¼c.
15%	"	27¼c.
18%	"	28¼c.

Nickel Silver Wire and Rod

10%	"	28¾c.
15%	"	32¼c.
18%	"	35½c.

MONEL METAL

Shot	32
Blocks	32
Hot Rolled Rods (base)	40
Cold Drawn Rods (base)	48
Hot Rolled Sheets (base)	42

BLOCK TIN SHEET AND BRITANNIA METAL

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more, 10c. over Pig Tin. 50 to 100 lbs., 15c. over 25 to 50 lbs., 17c. over, less than 25 lbs., 25c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker, 500 lbs. or over, 8c. over N. Y. tin price; 100 lbs. to 500 lbs., 10c. over Pig Tin. 50 to 100 lbs., 15c. over, 25 to 50 lbs., 20c. over, less than 25 lbs. 25c. over. Above prices f. o. b. mill.

SILVER SHEET

Rolled silver anodes .999 fine are quoted at from 70½c. to 72½c. per Troy ounce, depending upon quantity.

Rolled sterling silver 67¾c. to 69¾c.

NICKEL ANODES

90 to 92% purity	43 c.-45 c. per lb.
95 to 97% purity	45 c.-47 c. per lb.

Supply Prices, April 6, 1925

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone	lb.	.10–.14
Acid—		
Boric (Boracic) Crystals	lb.	.12
Hydrochloric (Muriatic) Tech., 20°, Carboys	lb.	02
Hydrochloric, C. P., 20 deg., Carboys	lb.	.06
Hydrofluoric, 30%, bbls	lb.	.08
Nitric, 36 deg., Carboys	lb.	.06
Nitric, 42 deg., Carboys	lb.	.07
Sulphuric, 66 deg., Carboys	lb.	.02
Alcohol—		
Butyl	lb.	.27–.32
Denatured in bbls	gal.	.60–.62
Alum—		
Lump Barrels	lb.	.04
Powdered, Barrels	lb.	.04½
Aluminum sulphate, commercial tech	lb.	.02⅜
Aluminum chloride solution in carboys	lb.	.06½
Ammonium—		
Sulphate, tech., bbls	lb.	.03¾
Sulphocyanide	lb.	.65
Argols, white, see Cream of Tartar	lb.	.27
Arsenic, white, kegs	lb.	.16
Asphaltum	lb.	.35
Benzol, pure	gal.	.60
Blue Vitriol, see Copper Sulphate.		
Borax Crystals (Sodium Biborate), bbls	lb.	.05½
Calcium Carbonate (Precipitated Chalk)	lb.	.04
Carbon Bisulphide, Drums	lb.	.06
Chrome Green, bbls	lb.	.34
Cobalt Chloride	lb.	—
Copper—		
Acetate	lb.	.37
Carbonate, bbls	lb.	.17
Cyanide	lb.	.50
Sulphate, bbls	lb.	.05¼
Copperas (Iron Sulphate, bbl.)	lb.	.01½
Corrosive Sublimate, see Mercury Bichloride.		
Cream of Tartar Crystals (Potassium bitartrate)	lb.	.27
Crocus	lb.	.15
Dextrin	lb.	.05–.08
Emery Flour	lb.	.06
Flint, powdered	ton	$30.00
Fluor-spar (Calcic fluoride)	ton	$75.00
Fusel Oil	gal.	$4.50
Gold Chloride	oz.	$14.00
Gum—		
Sandarac	lb.	.26
Shellac	lb.	.59–.61
Iron, Sulphate, see Copperas, bbl.	lb.	.01½
Lead Acetate (Sugar of Lead)	lb.	.13
Yellow Oxide (Litharge)	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.15
Nickel—		
Carbonate dry, bbls	lb.	.29
Chloride, 100 lb. lots	lb.	.22½
Salts, single bbls	lb.	.10½
Salts, double bbl.	lb.	.10
Paraffin	lb.	.05–.06
Phosphorus—Duty free, according to quantity		.35–.40
Potash, Caustic Electrolytic 88-92% fused, drums	lb.	.08¾
Potassium Bichromate, casks	lb.	.08¾
Carbonate, 80-85%, casks	lb.	.05¾
Cyanide, 165 lb. cases, 94-96%	lb.	.57½
Pumice, ground, bbls	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls	lb.	.03
Rouge, nickel, 100 lb. lots	lb.	.25
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in casks	lb.	.08
Silver Chloride, dry	oz.	.86
Cyanide (Fluctuating Price)	oz.	.70
Nitrate, 100 ounces lots	oz.	.48
Soda Ash, 58%, bbls	lb.	.02½
Sodium—		
Biborate, see Borax (Powdered), bbls	lb.	.05½
Cyanide, 96 to 98%, 100 lbs	lb.	.22
Hyposulphite, kegs	lb.	.04
Nitrate, tech., bbls	lb.	.04¾
Phosphate, tech., bbls	lb.	.03¾
Silicate (Water Glass), bbls	lb.	.02
Sulpho Cyanide	lb.	.45
Soot, Calcined	lb.	—
Sugar of Lead, see Lead Acetate	lb.	.13
Sulphur (Brimstone), bbls	lb.	.02
Tin Chloride, 100 lb. kegs	lb.	.39½
Tripoli, Powdered	lb.	.03
Verdigris, see Copper Acetate	lb.	.37
Water Glass, see Sodium Silicate, bbls	lb.	.02
Wax—		
Bees, white ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
Whiting, Bolted	lb.	.02½–.06
Zinc, Carbonate, bbls	lb.	.11
Chloride, 600 lb. lots	lb.	—
Cyanide	lb.	.41
Sulphate, bbls	lb.	.03⅛

COTTON BUFFS

Open buffs, per 100 sections (nominal),			
12 inch, 20 ply, 64/68, unbleached sheeting	base,		$32.40-$40.85
14 inch, 20 ply, 80/96, " "	base,		45.25- 50.80
12 inch, 20 ply, 80/96, " "	base,		47.35- 46.20
14 inch, 20 ply, 84/92, " "	base,		63.15- 62.25
12 inch, 20 ply, 88/96, " "	base,		..... 63.25
14 inch, 20 ply, 88/96, " "	base,		..... 85.15
12 inch, 20 ply, 80/96, " "	base,		..... 52.70
14 inch, 20 ply, 80/96, " "	base,		..... 70.80
Sewed Buffs, per lb., bleached and unbleached	base,		.55 to .75

FELT WHEELS

U. S. A. Brand		Price Per Lb. Less Than 100 Lbs.	100 Lbs. and Over
Diameter—10" to 16"	1" to 3"	$3.00	$2.65
" 6" 8" and over 16"	1" to 3"	3.10	2.75
" 6" to 24"	Over 3"	3.40	3.05
" 6" to 24"	½" to 1"	4.00	3.65
" 4" to 6"	¼" to 3"	4.85	Any quantity
" Under 4"	¼" to 3"	5.45	

Grey Mexican or French Grey—10c. less per lb. than Spanish, above.

FELT WHEELS

	6" to 18"	Over 18"	Under 6"
Over 3"	$3.00	$3.30	$3.75
1" to 3"	2.60	2.70	3.75
Under 1"	3.30	3.60	3.75